

HANDBOUND
AT THE



UNIVERSITY OF
TORONTO PRESS

THE
9445
I
Ophthalmoscope

A Monthly Review of Current Ophthalmology.

Editor :

SYDNEY STEPHENSON
(London).

Sub-Editor :

ERNEST THOMSON
(Glasgow).

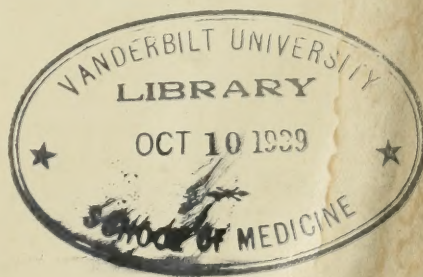
Editorial Secretary :

T. HARRISON BUTLER
(Leamington).

Correspondents :

Dr. JAMES BARRETT and Dr. T. K. HAMILTON (Australasia); Dr. P. COOTE and Dr. HANFORD McKEE (Canada); Lieut.-Col. H. HERBERT and Lieut.-Col. R. H. ELLIOT (East Indies); Dr. C. MANCHÉ (Malta); Dr. A. DARIER (France); Dr. G. F. ROCHAT (Holland); Professor A. BIRCH-HIRSCHFELD (Germany); Dr. RICKARD VIDÉKY (Austria-Hungary); Dr. A. ANTONELLI (Italy); Dr. H. COPPEZ (Belgium); Professor HAAB (Switzerland); Dr. FORSMARK (Scandinavia); Dr. EMILIO ALVARADO and Dr. ADOLFO ALVAREZ (Spain); Dr. M. URIBE - TRONCOSO (Mexico); ARTHUR F. MACCALLAN (Egypt); and A. W. STIRLING (Georgia, U.S.A.)

VOL. XI.
(1913)



London:

GEORGE PULMAN AND SONS, LTD.

1913.

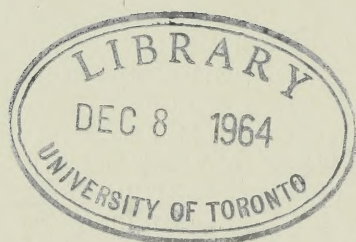
RE

1

078

v.11

no. 1-6



946573

INDEX

Original Communications and Clinical, Pathological and Bacteriological Memoranda.

	PAGE
BALLANTYNE, ARTHUR J.—Pulsation of the retinal arteries	271, 338, 460
BENNETT, H. PERCY.—Case of recurrent hæmorrhages into vitreous in a young patient (with retinitis proliferans) cured by administration of thyroid extract... ..	20
BRAILEY, W. H.—A method of operating on after-cataract, etc.	600
BRIDE, T. MILNES.—Epileptic fits induced by the use of eserine sulphate	21
BURCH, GEORGE J.—On negative after-images with pure spectral colours	143
BURDON-COOPER, JOHN.—Direct ophthalmoscopic examination with indirect vision and illumination	729
BUTLER, T. HARRISON.—Case of optic neuritis with retinitis and consecutive atrophy associated with pregnancy	597
CRAGGS, Lieut. H. C. and TAYLOR, Assistant-Surgeon, C. G.—A research into the relation between systematic blood tension and raised intra-ocular tension	350
CRIDLAND, BERNARD.—Gonorrhœal infection in eye diseases	64
————— The visual fields in coal miners' nystagmus	727
COATS, GEORGE.—Infarction of the posterior ciliary arteries	708
COLLINS, E. TREACHER.—A pathological report upon a case of Dooyne's choroiditis. ("Honeycomb" or "family" choroiditis)	537
CROSS, F. R.—Discussion on the present position of ophthalmology in Great Britain	518
DEUTSCHMANN, FRANZ.—The pathogenesis of sympathetic ophthalmitis	654
DOYNE, ROBERT W.—On the present position of ophthalmology	508
DRAKE-BROCKMAN, E. F.—A note on extraction of cataract by rupturing the capsule antecedent to the section through the cornea	351
ELLIOT, LIEUT.-COL. R. H.—A case of soamin poisoning resulting in optic atrophy	15
————— On the use and management of self-lit ophthalmoscopes	145
————— Some additional notes on sclero-corneal trephining	324
————— Trephining in glaucoma, acute and chronic: miscellanea	523, 580
GIRI, D. V.—Contact infection of carcinoma of the eye	202
————— On concretions in the optic nerve	390
GRÓSZ, EMILE V.—The methods of cataract extraction practised in the Royal Hungarian University Eye Hospital No. 1, Budapest	576
————— The No. 1 Royal Hungarian University Eye Hospital in Budapest	206
————— The present position of ophthalmology in Hungary	517
HARMAN, N. BISHOP.—A phantom for use in the practice of squint operations	285
————— A scheme for the exact record of fundus changes in myopia	335
————— Lengthening a rectus tendon in squint operations	17
————— Partial tenotomy of a lateral rectus to secure vertical deviation	74
HAWTHORNE, C. O.—The relation of ophthalmology to general medicine	513
HAY, PERCIVAL J.—Synchysis scintillans	663
HERBERT, H.—Some complications recently met with in glaucoma operations	398
IGERSHEIMER, J.—Recent investigations dealing with inherited syphilis of the eye	718
JOHNSON, G. LINDSAY.—Notes on the new operative treatment of glaucoma	539
JULER, F. A.—Acute purulent keratitis in exophthalmic goitre, treated by repeated tarsorrhaphy, resection of the cervical sympathetic, and X-rays: retention of vision in one eye	456
KILLICK, CHARLES.—A year's record of cataract extraction	11
LAMB, ROBERT SCOTT.—Perithelioma of the eyelids	401
MACCALLAN, A. F.—An operation for ectropion of the lower lids	538

	PAGE
McKEE, HANFORD.—Foreign body in the orbit : removal after two years	159
—————Meningococcus conjunctivitis	75
—————Retinitis pigmentosa : a pathological report	408
MADDOX, ERNEST E.—See Stirling, A. W.	660
MARPLE, WILBUR B.—On the electric ophthalmoscope with presentation of a new model ...	663
MOULD, GEORGE T.—Clinical notes on a case of glaucoma covering a period of twenty years...	76
OBARRIO, P. DE—Rational surgery of retro-bulbar neoplasms with report of a case of cylindroma of the orbit, with extirpation of the same and preservation of the eye	148
OLIVER, GEORGE H.—Hyaline bodies at the optic disc in a case of retinitis pigmentosa ...	716
—————Thirteen cases of hereditary transmissions of retinitis pigmentosa in two generations	407
PAUL, GEORGE A.—Congenital coloboma of both upper lids	473
PEEL, THOS. A.—Notes on the vaccine treatment of infections which involve the cornea ...	471
PERCIVAL, ARCHIBALD STANLEY.—Trephining the sclerotic	219
POSEY, WILLIAM CAMPBELL.—Two unusual orbital conditions	466
REEVE, R. A.—The present position of ophthalmology in Canada	513
RIDLEY, N. C.—Some commonplaces with regard to plastic operations	650
SOBHY, M.—Case of congenital coloboma of the lens	156
STEPHENSON, SYDNEY.—Case of septic endophthalmitis associated with the diplococcus lanceolatus	411
—————On the present position of ophthalmology in Great Britain	520
—————On some causes of failure after Elliot's sclero-corneal trephining ...	640
STEVENSON, EDGAR.—Case of acute glaucoma excited by homatropin	73
—————Foreign body, three inches long, removed from orbit of a small boy : wound of optic nerve	23
STIRLING, A. W.—Latent convergence or divergence ? with addendum by Ernest E. Maddox	660
THOMSON, ERNEST.—British and Continental eye cliniques ; some comparisons and contracts...	136
—————Hyaline nodules in the optic disc in a case of retinitis pigmentosa ...	19
TIRUMURTI, T. S.—Case of traumatic multilocular implantation corneal cyst	268
VERHOEFF, F. H.—A further note on the sclerectome	220
—————Brawny scleritis	2
WALLIS, G. F. C.—Elliot's trephining for glaucoma and its technique	588
—————Interstitial keratitis (congenital syphilitic) treated with salvarsan ...	342
—————The restoration of the anterior chamber after Elliot's operation	594
WHITHAM, LLOYD B.—Experiments on the excretion of salicylic acid in the ocular humours...	71
WHITNALL, S. E.—The ligamentum palpebrarum mediale	216
WOOD, C. G. RUSS.—On pseudoneuritis	530
—————and ANDERSON, FREDERICK A.—Guaiacol diaphoresis in ophthalmology	347
ZORAB, ARTHUR.—Aqueoplasty	211
—————A note upon essential oils in the treatment of irido-cyclitis	406

Translations.

ATTIAS, GUSTAVO.—Senile changes found in the human eye	222
GREEFF, R., STOCK, and WINTERSTEINER.—Guide to the microscopic examination of the eye. (Translated by Hugh Walker)	92, 170, 229, 288
RÖNNE, HENNING.—Studies on the fields of vision with reference to the relationship between peripheral visual acuity and colour sense and especially regarding their influence upon the prognosis of atrophy of the optic nerve	25
STARGARDT and OLOFF.—On the significance and the method of examining the colour sense	79

Novelties.

	PAGE
Director-forceps for use in partial tenotomy. (N. Bishop Harman)	24
Hand perimeter	540
Modified glaucoma trephine. (F. A. Anderson)	668
Near vision phorometer. (Ernest E. Maddox)	287
New cutting cystitome. (F. R. Cross)	413
New eyelid retractor. (C. G. Russ Wood)	221
New sclerectome. (Percy C. Bardsley)	160
"Signal" vision test type. (N. Bishop Harman)	667
Tarsal cyst forceps. (Arthur Greene)	733
Trephine worked by electric motor. (H. H. Taylor)	669

Book Notices.

	PAGE
Abstract-Bulletin of the Physical Laboratory of the National Electric Lamp Association, Cleveland, Ohio, Vol. I, No. 1. E. P. Hyde, Director	700
Accidents from defective sight. (Nettleship.) London, 1913.	567
Adrenaline mydriasis and its diagnostic significance. (<i>Die Adrenalin Mydriasis und ihre diagnostische Bedeutung.</i>) (Cords.) Wiesbaden, 1911	185
American encyclopedia and dictionary of ophthalmology. Edited by Casey A. Wood. Vol. I. A to Azio. Chicago, 1913.	698
Anatomy and histology of the human eyeball in the normal state, its development and senescence. (Salzmann.) (Authorized translation by Dr. E. V. L. Brown.) Chicago, 1912	262
Anatomy of the human eye, as illustrated by stereoscopic photographs. (Thomson.) Oxford, 1912	125
Angiomatosis of the retina. (von Hippel's disease.) <i>Die Angiomatose der Retina.</i> (von Hippelsche Krankheit). (Vossius.) <i>Sammlung zwangloser Abhandlungen aus dem Gebiete der Augenheilkunde</i> , Band IX, Heft i. 1913. Halle	260
Anomalies of scleral tension. (<i>Die Anomalien der Skleralspannung.</i>) Stransky, Bd. I. Leipzig und Wien. 1912	187
<i>Bericht über die Neununddreissigste Versammlung der Ophthalmologischen Gesellschaft</i> , Heidelberg, 1913. Wiesbaden.	698
<i>Bulletin de la Société Belge d'Ophtalmologie.</i> No. 34. Gand: 21-23. 1913.	187
<i>Bulletins et Mémoires de la Société Française d'Ophtalmologie.</i> Twenty-ninth year, 1912. Paris	54
Compendium of the pharmacopœias and formularies (official and unofficial), with practical aids to prescribing and dispensing. (Thompson.) Fourth Edition. London, 1913	701
Diseases and injuries of the eye. (Edinburgh Med. Series.) (Sym.) London, 1913	568
Diseases of the eye. (de Schweinitz.) Seventh Edition. London and Philadelphia, 1913	698
Diseases of the eyes. (Marshall.) London, 1912	123
Elliot's corneo-scleral trephining: a technical study, anatomical and experimental researches. (<i>La trépanation cornéo-sclérale d'Elliot: étude technique, recherches anatomiques et expérimentales.</i>) (Ducamp.) Paris, 1913	636
Eye-strain in everyday practice. (Stephenson.) London, 1913	186
<i>La rétinite albuminurique.</i> (Albuminuric retinitis.) (Rochon-Duvigneaud.) Paris, 1912	54
<i>Le nystagmus (tremblement oculaire).</i> (Coppez.) Paris, 1913	446
Geometrical optics. (Percival.) London, 1913	314
Guide to the microscopic examination of the eye. (Greeff, Stock, and Wintersteiner.) Translated from the third German edition by Hugh Walker. London, 1913	699
<i>Julius Hirschberg's Ausgewählte Abhandlungen.</i> (1868-1912.) Fehr and Muhsam. Leipzig. 1913	634

	PAGE
Merck, E.—Annual report on recent advances in pharmaceutical chemistry and therapeutics.	
Vol. XXV. 1912. London	56
Vol. XXVI. 1913	701
Miners' nystagmus : its causes and prevention. (Llewellyn.) London, 1912	263
(Das Augenzittern der Bergleute.) (Ohm.) Leipzig, 1912	127
Monograph on albinism in man. (Pearson, Nettleship, and Usher.) (Drapers' Company research memoirs, biometric Series IX.) Text part IV., and atlas part IV. London, 1912	764
On traumatic dislocation of the lens. (Ueber traumatische Linsenluxation.) Davids. Halle, 1912	635
Ophthalmic semiology and diagnosis. (Pyle's System of Ophthalmic Practice.) (Beard.) Philadelphia	447
Ophthalmic surgery. (Meller.) (Edited by W. M. Sweet). Second edition. London, 1912	315
Ophthalmic year book. Vol. IX. Edited by E. Jackson. Denver, 1913	567
Opuscula selecta Neerlandicorum de arte medica. Fasciculus II. (Camperi). Amsterdam, 1913	500
Origin of myopia. (Die Entstehung der Kurzsichtigkeit.) (Levinsohn.) Berlin, 1912	54
Origin of spherical refractions of the human eye. (Die Entstehung der sphärischen Refraktieren des menschlichen Auges.) (Steiger.) Berlin, 1913	765
Outlines of applied optics. (Nutting.) Philadelphia, 1912	315
Over de Accommodatie en Refractie van het oog. Een Kort Overzicht van het Werk van Donders en van de Voordeelen die in de laatste 50 Jaar zijn Gemaakt. (Clarke.) Amsterdam, 1913	500
Précis d'ophtalmologie. (Morax.) Deuxième Edit. refondue. Paris, 1913	700
Researches in colour vision and the trichromatic theory. (Abney) London	449
Royal London Ophthalmic Hospital Reports. Edited by J. H. Parsons. Vol. XIX., pt. 1, July, 1913	566
Sclero-corneal trephining in the operative treatment of glaucoma. (Elliot.) London, 1913	264
Significance of the teachings of heredity in ophthalmology. (Die Bedeutung der Vererbungslehre für die Augenheilkunde.) (Peters.) Halle, 1911	377
Studies in clinical medicine. (Hawthorne.) London, 1912	122
Surgery of the eye. (Török and Grout). London, 1913	501
Text-book of diseases of the eye. (Lehrbuch der Augenheilkunde.) (Professors Axenfeld, Bach, Bielschowsky, Elschnig, Greeff, Heine, Hertel, v. Hippel, Krückmann, Oeller, Peters, and Stock.) Edited by Professor Axenfeld. Third edition. 1912	261
Text-book of ophthalmology in the form of clinical lectures. (Roemer.) Translated by M. L. Foster. Vols. I, II, III. London	185, 378
Trachoma and its complications in Egypt. (MacCallan.) London. 1913	764
Transactions of the American Ophthalmological Society. Vol. XIII, Part i. 1912	125
Transactions of the American Ophthalmological Society, Forty-ninth Annual Meeting. Washington, D.C., 1913. Vol. XIII. Part ii. Philadelphia. 1913	698
Transactions of the Ophthalmological Society of the United Kingdom. Vol. XXXII, Fasc. 3 1912	53
Vol. XXXIII, 1913	638
Transactions of the Seventeenth Annual Meeting of the American Academy of Ophthalmology and Oto-Laryngology, held at Niagara Falls, Ontario, on August 20; 21, and 22, 1912	447
Treatment after operation. (Turner and Carling.) London. 1912	190
Vicious circles in disease. (Hurry.) London. Second edition. 1913	260

NAMES.

	PAGE		PAGE
Abadie, C.	255, 541	Butler, T. H.	384, 435, 597, 630
Abney, Sir W. de W.	449	Byers, W. Gordon M.	235
Adams, M. A.	382		
Addario, C.	492	Calderaro	182, 371, 413
Agricola, B.	435, 692	Calendoli, S.	747
Albanese	682	Calhoun	415
Alexander, E. W.	357	Calhoun, F. P.	498
Alger, E. M.	498	Calhoun, J. G.	622
Alt, Adolf	34, 112, 614, 742	Camille	679, 753
Anderson, F. A.	255, 347, 668	Campbell, E. K.	631
Antonelli, A.	178, 255, 617	Camperi, P.	500
Arboleda	679	Canilla, G.	372
Armaignac, H.	297, 676	Caralt	561
Attias, G.	222, 547	Cassimatis	297
Angstein	425	Chaillous, F.	369
Aurand, L.	487	Chaillous, J.	485, 692
		Chatterton, E.	692
Bach, L.	674	Chauffard	47
Bahn, C. A.	632	Chevalier, G.	53, 556
Baildon, F. J.	108	Churchill, S.	296
Ballantyne, A. J.	271, 338, 460, 503	Claiborne, J. H.	498
Barck, C.	632	Clapp, C. A.	753
Bardsley, P. C.	160	Clarke, E.	416, 500
Barnes, S.	606	Clausen, W.	758
Barr, J. S.	632	Clausen	679
Bartels, M.	28	Clausnizer, Th.	52
Batten, F. E.	553	Coats, George	496, 670, 708
Baudry, S.	561	Cohen, M.	541, 679
Bayer, H.	614	Collier, J.	553
Beard, C. H.	447	Collins, E. T.	537, 550, 551, 743
Beauvieux	182, 561	Colombo, G. L.	415
Beduarski	176	Connor, F. P.	747
Behr, C.	734	Coppez, H.	247, 446, 604, 605
Belenky-Raskin	674	Coppez, V. M. Jean	109
Bennett, H. Percy	20	Cords, R.	545
Berche	103	Coronat	364
Betremieux, P.	357, 429	Coulomb, R.	692
Bey, S.	747	Craggs, H. C.	350
Bietti, A.	354, 756	Cramer, E.	606
Birch-Hirschfield, A.	255, 429, 482	Cridland, B.	64, 727
Bishop, J. T.	372	Critchett, Sir Anderson	503
Bistis, J.	182	Critchley, H. G.	697
Blaauw, E. E.	296	Cross, F. R.	413, 518
Bogatsch, G.	357	Cunningham, H. H. B.	34
Botteri, A.	492		
Bourdier	354	Dalmer	422
Bourland	605	Danis, M.	357, 541, 624
Brailey, W. H.	600	Danis, R.	624
Brandenburg, F.	542	Darling, C. G.	605
Brandès, F.	180	Darier, A.	296, 498, 692
Brav, A.	684	Darrieux	48
Brewerton, Elmore	552	Davids, H.	635
Bribak, E. J.	297	Davis, A. E.	619
Bride, T. Milnes	21	Dawney, A. H. P.	384
Bronner, A.	372, 678	Del Monte, A.	353
Brown, S. H.	364	Delord	34, 662
Brown, W. McEnery	296	de Saint Martin, R.	605
Browne, F. J.	175	de Schweinitz, G. E.	114, 176, 625, 698, 743
Browning, S. H.	234, 692	Desvaux, E.	561
Brückner, A.	753	Deutschmann, F.	108, 654
Brunetière, C.	483	Deutschmann, R.	103
Bruno, D.	498	Devaux, E.	442
Brunszlow	414	Digby, K. H.	560
Burch, George J.	143	Dodd, O.	753
Burdon-Cooper, J.	729	Domann, P.	684

	PAGE		PAGE
Domec, Th.	53	Grimsdale, H.	161
Dor, L.	251, 365, 443, 485, 562, 626	Groes-Petersen	33
Dorff, H.	679	Grönholm, W.	244
Dorrell, E. A.	736	Gross, J. H.	105
Dowling, J. I.	632	Gross, J.	679
Doyne, R. W.	508, 553	Grosz, Emil v.	206, 517, 576
Drake-Brockman, E. F.	351	Grout, G. H.	501
Dreisch	604	Gruening, E.	180, 247
Drualt, A.	474	Grunert	604
Ducamp	636	Grüter, von	613
Duclos	614	Guibert	684
Dufour, R.	741	Guillery	684
Dupont	34	Gunnufsen, Ths.	244
Dupuy-Dutemps	434, 484, 605, 627	Guzmann, E.	435
Duran, C.	117		
Durand	612	Hamburger,	758
Dutoit, A.	182, 313, 498, 606, 693	Hanke, V.	474
Duverger	759	Harman, N. Bishop	
Dwyer, J. G.	758	17, 24, 74, 285, 335, 422, 432, 552.	667
		Harris, C. M.	182
Eales, H.	196	Harry, P. A.	371
Eason, H. L.	552	Handmann, M.	756
Edridge-Green, F. W.	58, 425, 560	Hawthorne, C. O.	122, 513
Elliot, R. H.	15, 59, 145, 259, 264, 296, 324, 378	Hay, P. J.	663, 697
	523, 580	Heerfordt, C. F.	367
Elschnig, A.	684, 747	Hegner, C. A.	743
Eppenstein, A.	617	Heller, S.	176
Ettles, Wm.	372	Henderson, F. L.	443
Ewing, A. E.	32, 112	Hepburn, M. L.	118
		Herbert, H.	398
Fau	303	Herff, Otto v.	371
Ferentincs, Sp.	747	Hertel, E.	734
Fergus, A. F.	297	Hess, C.	614
Fehr	634	Hessberg, R.	442
Fleischer, B.	105, 354	Hesse, R.	737
Foster, J.	296	Higgins, C.	48
Foster, M. L.	378	Hilbert, R.	425, 676
Fox, L. W.	247, 443	Hill, Emory	553
Franco	178	Hime, Major H. G. R.	247
Frank	498	Hinshelwood, J.	546, 605
Frankal, H.	605	Hirschberg, J.	198, 253, 431
Franke	684	Hoewe, J. Van der	105
Frankenstein, J.	498	Hoffmann, R.	357
Franz, V.	601	Hoffmann, T.	605
Frenkel, H.	421, 555	Holden, W. A.	443
Frescoin, L. D.	252	Holloway, T. B.	560, 625
Fromaget, H.	313, 679, 753	Holmes, Gordon	552, 741
Fricker, E.	242	Holth, S.	429
Friedenwald, P.	435	Hoor, Karl v.	622
Fritzberg, W.	474	Hoppe, J.	50
Fujita, H.	474	Horniker, E.	676
		Hosford, J. Stroud	49
Gabriélidès	605, 628, 632	Howitz, I.	313
Galezowski, J.	753	Hudson, A. C.	234, 551, 556
Gallenga	357	Hurry, J. B.	260
Galloway, A. R.	234	Hutchinson, Sir Jonathan	503
Gamble, W. E.	673	Hyde, G. P.	700
Gebb	434, 440		
Geerts, J.	357	Ichikawa, K.	743
Gilbert, W.	242, 365	Igersheimer, Jos.	365, 435, 443, 718
Ginsberg, S.	758	Isabolinsky	492
Giri, D. V.	202, 390	Ischreyt, G.	475
Gonin	618, 620	Ishihara, S.	679, 743
Gonzalez	178		
Gonzalez, José de Jesus	255	Jackson, E.	567, 747
Gradle, H. S.	244	Jacqueau	48
Grandclément	693	Jakobs, M. W.	234
Granert	370	James, G. B.	247
Greeff	92, 170, 229, 288, 699, 737	Janson, E.	692
Green, John, Jr.	742	Jaspers, I.	756
Greene, A.	733	Jeillais	357
Greeves, R. A.	431, 549	Jensen, E.	33
Grignols, F.	480	Jocqs, R.	296, 313, 485, 677

	PAGE		PAGE
Johnson, G. L. ...	539	Metafune ...	682
Jones, E. L. ...	372	Meyerhof ...	308
Juler, F. A. ...	384, 456	Morax, V. ...	303, 485, 700
Junins ...	50, 492	Moreau ...	747
Kalt ...	627	Moret, E. T. ...	382
Kambe, Toshiro ...	614	Mould, G. T. ...	76
Kapuscinski, W. ...	30	Mouradian ...	541
Kaufmann, M. ...	758	Moxon, F. ...	759
Killick, Charles... ..	11	Muhsam ...	634
Klmedinst, J. F. ...	605	Muncaster, S. B. ...	440
Knapps, G. H. ...	605	Münch, K. ...	253
Köllner ...	425	Mylius, W. ...	753
Komoto, J. ...	109	Nesfield, V. B. ...	556
Koster, Gzn. W. ...	632	Nettleship, E. ...	567, 764, 767
Krailsheimer, R. ...	743	Neves da Rocha ...	440
Krusins ...	679	Noceti ...	605
Kuffler, O. ...	479	Norman, A. B. ...	692
Kümmell, R. ...	108, 178	Nuel ...	47
Lacompte, F. ...	753	Nutting, P. G. ...	315
Lagrange, F. ...	247, 555, 561, 572	Oatman ...	357
Lamb, R. S. ...	401	Ochsner, A. J. ...	440
Lang, B. T. ...	416	Ogawa, K. ...	235
Lang, Wm. ...	416	Ohm ...	127
Langenbeck, R. ...	105	Oliver, G. H. ...	407, 716, 737
Lawford, J. B. ...	416, 552, 632	Oloff, Fleet-Surgeon ...	79
Laws, W. G. ...	432	Oloff, H. ...	357
Lawson, A. ...	562	Onfray ...	371
Lazareff ...	234	Opin ...	435
Lee, C. G. ...	382, 450	Ormond, A. W. ...	496, 605, 606, 679
Lehle, A. ...	371	Ostwalt, F. ...	296
Leishmann, Lieut.-Col. W. B. ...	442	Paparcone, Ernesto ...	32
Lemoine, P. ...	297, 545	Parisotti ...	303
Lenz ...	426	Parker, F. J. ...	105
Le Roux, H. ...	625	Parson, H. ...	552
Le Roy, B. ...	372	Parsons, J. H. ...	556, 566
Levinsohn ...	54	Paton, L. ...	247, 562
Lindahl, C. ...	34	Pearson, Karl ...	764
Llewellyn, T. L. ...	263	Pechdo ...	684
Lloyd, J. H. ...	114	Péchin ...	255, 606
Lloyd-Owen, D. C. ...	321	Peel, T. A. ...	471
Löhlein, W. ...	234, 368	Percival, A. S. ...	219, 314
Lohmann, W. ...	632	Peretz ...	632
Löwenstein, A. ...	353	Peter, L. C. ...	435
Luedde, W. H. ...	118, 244, 753	Peters, A. ...	377, 684
Lutembacher ...	605	Pfalz, G. ...	678
MacCallan, A. F. ...	538, 764	Phelps, E. ...	737
McHardy, M. M. ...	195, 321	Pickler, A. ...	234, 756
Mackay, G. ...	176, 297, 322, 561	Pokrowski ...	297
McKee, H. ...	75, 159, 408	Posey, W. C. ...	466
Mackenzie, J. Ross ...	175	Poynton, F. J. ...	552
MacNab, A. ...	372	Precerutti ...	498
McReynolds, J. O. ...	684	Purtscher, V. ...	621
Maddox, E. E. ...	287, 747	Puscarin, Elena ...	488
Maklakoff, Prof. ...	247	Rados, A. ...	435, 614
Maklakow, A. ...	247	Reeve, R. A. ...	484, 513
Maklakow, W. ...	484	Reid, J. ...	206
Magitot, A. ...	309, 601	Reis, W. ...	51, 108
Manolesco, D. N. ...	692	Revel ...	34, 622
Marlow, F. W. ...	606	Ridley, N. C. ...	650
Marmoiton ...	357	Risley, S. D. ...	415, 552
Marple, W. B. ...	382, 663	Ritchie, L. C. Peel ...	561
Marshall, C. D. ...	123, 259	Rochon-Duvigneaud ...	39, 54, 371, 614
Mattice, A. F. ...	682	Roemer, P. ...	378
Mawas, J. ...	47, 491, 601, 614	Rohmer ...	562
Max, W. ...	357	Rollet, E. ...	482, 487, 612
May, C. H. ...	182	Rönne, H. ...	25, 605
Mayou, S. ...	258, 317	Rosenhauch ...	120
Meding, C. B. ...	747	Rowan, J. ...	632
Meller, J. ...	315	Rübel, E. ...	105
Menacho ...	756		

	PAGE		PAGE
Rubert, J.	619	Tirumurti, T. S.	268
Rueben	367	Toczyski, F.	244
Rutherford, L. T.	432	Tooke, F.	234, 251, 297
Rutson, J. R.	553	Torok, E.	501
		Trantas	753
Sachs, E.	240	Truc	435
Salus, R.	235, 549	Tschirkowsky, W.	371
Salzmann	358	Turner, J.	108
Santer, A. C.	677	Turney, H. G.	552
Santos-Fernandez, J.	182, 255		
Sattler, C. H.	105, 253, 371, 556, 747	Uhlenhuth, E.	474
Sava-Goin	678	Uthhoff, W.	357
Savage, G. C.	440	Urao Arisawa	479
Schieck	613	Usher, C. H.	764
Schnaudigel, O.	247, 365, 371		
Schneider, R.	372	Vail, D. T.	432, 624
Schrimer, O.	105	Valois, G.	297, 545
Semple, N. M.	358	Van der Hoeve, J.	105
Shaw, Cecil	383	Van Lint, A.	235
Shoemaker, J. F.	415, 490	Vassilopoulos, V.	354
Shumway, E. A.	743	Vaughan, H.	619
Sidler-Huguenin	252	Velter, E.	97, 114
Siegrist	370	Verhoeff, F. H.	2, 220, 548
Smith, D. P.	247	Verry-Westphal, A.	759
Smith, E. T.	570	Villard	34, 38, 415, 605
Smith, F. F. S.	747	Villardo, A. de L.	34
Smith, Henry	556, 747	Velhagen, C.	614
Smith, Homer	747	Vinsonneau	545
Smith, Priestley	297	Vital-Bérard	555
Snyder, W. H.	491	Vogt, A.	734
Sobhy, M.	156	von Hippel, E.	415, 716
Spassky	492	von Mende, R.	247
Spellissy, J. M.	114	Vossius, A.	260
Spencer, F. R.	443		
Stähli, J.	734	Walker, H.	699
Stargardt, K.	79, 614, 756	Wallis, G. F. C.	342, 588, 594
Starr, M. Allen	31	Warlomont	550
Steiger, A.	765	Watzold	605
Steiger, O.	490	Webster-Fox, L.	502
Steiner, L.	35	Weekers	109
Steinhaus, J.	235	Weil	303
Stephenson, Sydney	113, 411, 422, 520, 640, 758	Weill, G.	556
Stevenson, Edgar	23, 73, 562	Weiner, A.	34
Stewart, T. G.	552, 553	Werncke, Th.	440
Stilling, J.	474	Werner, L.	37, 670
Stirling, A. W.	660	Wessely, K.	367, 371
Stock, Professor	92, 170, 229, 288, 291, 365, 443, 699	Westhoff, C. H. A.	382
Stoewer, P.	605, 684	Weve, H.	474
Stoll, K. L.	443	White, W. Hale	606
Strebel, J.	490	Whitham, L. B.	53, 71
Stuelp, O.	415	Whitnall, S. E.	216, 601
Sumner, F. W.	747	Wicherkiewicz, B.	48, 247, 498, 753
Swanzy, Sir H. R.	320, 383, 451	Widal	303
Sweet, W. M.	315	Wilcox, W. H.	553
Sym, W. G.	568	Williams, E. Cecil	553
Szily, Aurel v.	480	Wilson, J. A.	756
		Wilson, S. A. K.	552
Taft, W. H.	176	Wintersteiner, Professor	92, 170, 229, 288, 699
Takayasu, M.	235	Wirtz, R.	740
Taylor, C. G.	350	Wölffin, E.	562
Taylor, H. H.	669	Wood, Casey A.	698
Taylor, J.	670, 741	Wood, C. G. Russ	221, 347, 530
Taylor, Seymour	696	Woodruff, T.	176
Terrien, F.	47	Würdemann, H. V.	442
Terson, A.	46, 440	Wydler, V.	734
Teulières	429		
Thies, O.	435	Yeld, R. A.	630
Thompson, C. J. S.	701		
Thompson, Theodore	552	Zeeman, W. P. C.	103
Thomson, A.	125	Zentmayer, W.	103
Thomson, Ernest	19, 136, 372, 424	Zirm	108
		Zorab, A.	211, 317, 406

SUBJECTS.

Entries printed in thick type indicate grouped or special abstracts.

	PAGE		PAGE
Absorption of Cataract ...	32	Anophthalmus with palpebral cysts ...	234
Accessory sinuses of the nose, enlargement of the blind spot in diseases of the ...	105	Anterior chamber, restoration of, after Elliot's operation ...	594
Accidents which have occurred through colour-blindness ...	560	— segment of the eye, nerves of the, senile changes in the ...	228
Accommodation, apparatus of, in reptiles ...	474	Anti-diphtheric serum, influence of on infective diseases of the eye ...	692
— influence of cocaine and homatropine upon ...	313	Anti-glaucomatous sclerectomy ...	627
— persistent paralysis of, after diphtheria ...	357	Antiseptic measures in ophthalmic surgery ...	372
Acne rosacea ...	560	Aortic aneurism, ocular complications in ...	605
— and keratitis ...	561	Appointments 59, 130, 197, 334, 451, 570, 702	
— ocular manifestations associated with ...	560	"Aqueoplasty" ...	211
Acromegaly, case of ...	553	Aqueous humour, acute intoxications due to methyl alcohol ...	480
— bitemporal hemianopsia with ...	552	— intra-ocular coagulation of the ...	424
— case of, with signs of regression ...	552	Arc light, unilateral optic atrophy after exposure to ...	678
— disease of the pituitary body, without ...	37	Arcus juvenilis and arcus senilis ...	547
— early, pituitary tumour with ...	552	— senilis and arcus juvenilis ...	547
Adenoma of the Meibomian glands ...	632	Argyrosis ...	112
Admiralty test for colour blindness ...	560	— of the conjunctiva ...	112
Adrenaline, mydriasis due to ...	255	Arsenic and thyroid, and its associated internal secretions in diseases of the eye ...	440
Ætiology of Diseases of the Eye ...	673	Arsenobenzol, cranial polyneuritis after treatment by ...	255
— of Iritis ...	630	— eye complications following the use of ...	182
After-Cataract, method of operating upon ...	600	— paraplegia follows injection of ...	255
Airol, insufflation of, bismuth excretion upon the cornea, after ...	498	Arteries, posterior ciliary, infarction of the ...	708
Albuminuric retinitis , ...	39, 303	Arterio-sclerosis of the retinal vessels ...	357
— ætiology of ...	323	Ascarides, conjunctivitis due to ...	678
— and retention of nitrogenous substances in the blood ...	303	Aseptic, antiseptic and prophylactic measures in ophthalmic surgery ...	372
— lipoids and white plaques in ...	614	Asthenopia and conjunctivitis, ætiology of ...	415
Alimentary toxæmia, its sources, consequences, and treatment ...	416	"Atrophic myotonia" cataract in and with ...	605
Amaurotic idiocy, or Tay-Sachs' disease ...	103	Atropine, action of, in diffuse parenchymatous inflammation of the cornea ...	498
Amblyopia, hysterical, diagnostic value of the form and colour fields in ...	105	— and duboisine in the treatment of eye diseases in children ...	182
Amblyopia, hysterical, of dental origin ...	626	— tablets for the determination of refraction in children ...	759
Amphibians and reptiles, rudimentary visual organs of ...	474	Atrophy of the iris and epibulbar carcinoma associated with xeroderma pigmentosum ...	357
Amphibian eye, transplanted, influence of the host on the ...	474	— of the optic nerve ...	25
Amyloid degeneration of the conjunctiva ...	743	Autocytotoxic theory of senile cataract ...	234
Amæmic fundus ...	358	Auto-intoxication, gastro-intestinal, a cause of eye trouble ...	415
Anæmia , post-hæmorrhagic, blindness which follows ...	357	Autoserotherapy and subconjunctival injections ...	498
— severe, spontaneous conjunctivo-palpebral ecchymosis in ...	606	— in ophthalmology ...	500
Anæsthesia , general ...	482	Bacteria of the eye ...	201
— local ...	624	Bacteriology ...	201
— regional, eye operations practised under ...	624	— of conjunctivitis, value of the "direct smear" in the ...	234
— surgical, in the lacrymal gland ...	482	Belgium Ophthalmological Society ...	386
Anaphylaxis in eye work ...	480	Bilateral papilloedema with central scotoma, from sinusitis ...	105
Anatomical study on infantile glaucoma ...	305	Bio-chemical reaction of the lens ...	51
Anatomy and Physiology ...	601	Biology of light ...	734
Aneurism of the aorta and tabes ...	605	Bismuth excretion upon the cornea after insufflation of airol ...	498
— of the central retinal artery in the course of pregnancy ...	357	Bjerrum method of investigating the field of vision in glaucoma ...	105
Angiopathia in retina traumatica ...	621	Blennorrhœa, congenital, of the lacrymal sac ...	296
Angiosarcoma of the iris and ciliary bodies ...	353		
Anophthalmic, an eyebath for the ...	692		

	PAGE		PAGE
Blennorrhœa inclusion, clinical, experimental		Cataract extraction, a year's record of	11
and microscopic studies of	492	expulsive hæmorrhage	
of the lacrymal sac	296	after	614
Blepharo-conjunctivitis and perlèche, relation-		followed by sympathetic	
ship between	679	disease treated with	
Blind, industrial education of the	176	tuberculin	108
spot, enlargement of the, in disease of		management of the cap-	
the posterior accessory sinuses of the		sule in, and afterwards	747
nose	105	of, by rupturing the	
spot, size of, in the emmetropic eye...	105	capsule	351
Blindness	176	of in its capsule	556
among Egyptian children in		operation	555
Cairo, causes and frequency of	632	relative value of recent	
caused by the eclipse	545	improvements	556
causes and prevention of	176	sympathetic irido-cyclitis	
eclipse	482	following	684
in children, causes of	176	with peripheral iridec-	
prevention of	176	tomy	556
which follows acute post-		dangerous, safety device	
hæmorrhagic anemia	357	for	747
word	546	in and with "atrophic myotonia"	605
Blood examinations in glaucoma patients	368	in the capsule, new operation for...	49
Board of Trade, sight tests of the	319	intra-capsular extraction of, details	
Booth, "General," the case of	48	of vision in 132 cases	556, 747
Bowman lecture, 1914	571	intra-capsular operation for	747
Bradycardia after grave ocular trauma	357	lamellar, and tetany	737
Brawny scleritis	2	method of extraction practised at	
British Medical Association, Brighton meeting	322	the University Eye Hospital,	
Budapest Eye Hospital, method of cataract		Budapest	576
extraction practised there	576	operating for, methods of avoiding	
No. 1 Royal Hungarian University,		prolapse of the vitreous in	747
Eye Hospital in	206	operations	747
Bulbar conjunctiva, cavernous lymphan-		operations, control of the eye in	747
gioma of the	34	senile, autocytoxic theory of	234
epithelioma of the	34	microscopic findings in a	
Buphthalmos	364	fatal case of...	235
pathology and treatment of	242	operation for with the	
with full vision and without		keratome	556
cupping of the optic disc	550	simple flap extraction of	747
with good sight	550	treatment of early stages	
unilateral case in which a		of	371
positive Wassermann reaction was		spontaneous absorption of...	32
obtained	364	unilateral, treatment of	556
Calcareous conjunctivitis, chronic	679	with its capsule, extraction of	747
degeneration of the cornea and lens		Cataractous lens, intracapsular extraction	
capsule	234	of	747
Canada, present position of ophthalmology in	513	Cataracts due to electric discharge	677
Canthus, inner, gummatous inflammation		immature, preliminary capsulo-	
of the	753	tomy in	747
Capillary angiomatosis of the retina	421	nuclear, use of euphthalmine in	440
Capsulotomy, preliminary, especially in		senile, determination of ripeness of,	
immature cataracts	747	by bio-chemical reaction of the	
Carcinoma, epibulbar	743	lens...	51
of the eye, contact infection of...	202	slow-growing, operative treatment	
Cardiovascular disease, ocular affections		of	556
associated with	415	Catheterism of the lacrymal passages	297
Caruncle, tumours of the	35	Cauterisation, superficial, of granulations	371
Caruncula lacrymalis, pathological anatomy		Cavernous degeneration of the optic nerve	235
of the	614	Cell bodies in trachoma	492
Catarrh, vernal, pathology of	614	Central London Ophthalmic Hospital	572
Cataract	555	Cerebellar ataxia, with symptoms of	
absorption of	32	hypophyseal lesion	553
after, method of operating upon...	600	Cerebral decompression	114
and heterochromia, relation which		in which cerebral	
exists between	601	hernia resulted	
causation of	601	with marked im-	
dacryocystitis and epithelioma of		provement in optic	
the cheek on the same side in a		neuritis	114
woman	555	relation of, to the	
diabetic	555	relief of the ocular	
double, the case of General Booth	48	manifestations of	
extraction	503, 569	intracranial ten-	
		sion	114

	PAGE		PAGE
Cerebral localisation of some visual phenomena	741	Cornea, layers of the	92
Chancre, conjunctival	753	— lipoid granules in the fixed cells of the ...	614
Chlamydozoa of Prowazek and Halberstädter, diagnostic value of, in trachoma	492	— nodular opacities of the	488
Choked disc, diagnostic value of in intracranial diseases	357	— oval, and the blue sclerotic in hereditary syphilis	617
Choroid, flat sarcoma of the	614	— papilloma of the, cured by mesothorium	692
— inflammatory and vascular diseases of the	118	— pathology of rodent ulcer of the ...	743
— microscopic examination of the ...	171	— primary fatty degeneration of the ...	235
— rupture of, and high myopia	736	— senile changes in the	222
— sarcoma of the	742	— tumours of the	34
Choroidal tubercle, glaucomatous form of ...	434	— vaccine treatment of infections of the	471
— tumour, microscopical examination of the eye in	742	— vertically-oval form of	617
Choroiditis	719	Corneal cells and lacunæ	94
— (Doyle's) pathological report on on a case of	537	— corpuscles, fixed	94
— "Honeycomb" or "Family"	537	— cyst, traumatic multilocular implantation	268
Chromatopsias, the true	676	— epithelium	93
Ciliary body and iris, angiosarcoma of the ...	353	— of a glaucomatous eye	614
— senile changes in the	225	— fibrillæ	94
— portion of the retina, structure of the ...	601	— nerves	96
Circulatory Phenomena of the eye	118	— ulcer, iodine in	372
Cocaine and homatropine, influence of upon accommodation	313	Correspondence ... 57, 191, 258, 317, 381, 502, 569, 695	
— as a local anæsthesia	313	Concretions in the optic nerve	390
Coloboma, congenital, of both upper lids ...	473	— of the lacrymal canaliculi	354
— of the lens	156	Congenital anterior staphyloma	551
Colorado, University of, course in ophthalmology	60, 443, 703	— coloboma of both upper lids { ...	473
Colour-blindness	560	— elephantiasis and infantile glaucoma	364
— accidents which have occurred through	560	— syphilitic diseases of the eye	753
— the Admiralty test for	560	Conical cornea	370
— discrimination of	425	Conjunctiva and sclera, tuberculosis of the ...	435
— fields in hysterical amblyopia	105	— amyloid degeneration of the ...	743
— sensations, complete system of	425	— argyrosis of the	112
— sense	425	— bulbar, cavernous lymphangioma of the	34
— and peripheral visual acuity, relationship between	25	— epithelioma of the	34
— centre	426	— tuberculosis of the	435
— method of examining the	258	— tuberculosis of the, cured by the serum of Marmoreck	313
— on the significance of the method of examining the ...	79	— inflammations of the	678
— testing the	676	— lipoma of the	34
Colour Vision	676	— papilloma of the, cured by mesothorium	692
— tests	571	— pemphigus of the	679
— and colour - blindness, Hunterian lectures on	425	— pneumococci on the, after extirpation of the lacrymal sac ...	682
— and Daltonism	676	— staphylococcal infection of the, a rare form of	679
— normal, and colour weakness, demarcation between	425	— traumatic cysts of the	34
Coloured wool for the investigation of Daltonism	676	— tumours of the	34
Comparative Anatomy and Physiology of the Eye ...	474	— vernal	679
— morphology of the eye in the duck family ...	475	Conjunctival xerosis, hemeralopia and ...	746
Cornea and lens capsule, calcareous degeneration of the	234	— affections associated with so-called trachoma bodies ...	679
— bismuth excretion upon the, after insufflation of aïrol	498	— chancre	750
— diffuse parenchymatous inflammation of the, action of atropine in ...	498	Conjunctivitis	718
— dystrophia epithelialis (Fuchs)	50	— and asthenopia, ætiology of	415
— epithelioma of the	34	— bacteriology of, the value of the "direct smear" in the ...	234
— formation of "Drusen" at the surface of the	353	— chronic calcareous	679
— inflammation of the	97	— croupous	622
— in the rabbit, pneumococcal infections of the, treated by alkaloids	758	— diphtheritic	622
		— diplobacillary, vaccine and serum therapy in	371
		— diplobacillary, notes on an epidemic of	678
		— due to ascarides	679
		— gonococcal, epidemic in Egypt and its relation with trachoma ...	308

	PAGE		PAGE
Conjunctivitis, gonorrhœal, of the new born, involvement of the middle ear in	422	Dystrophia marginalis corneæ	50
— membranous	662	Echymosis, spontaneous conjunctivo-palpebral, in severe anæmia	606
— meningococcus	75	Eclipse blindness	482, 545
— Parinaud's	120, 548	Ectopia lentis, keratoconus and	490
— etiology of	679	Ectropion of the lower lids, an operation for	538
— phlyctenular	619	Egyptian children in Cairo, causes and frequency of blindness among	632
— pseudo-membranous, cured by serum	53	— ophthalmia	308
— subacute, diplobacillus of, action of sulphate of zinc on	759	Electric colloidal mercury in ocular therapeutics	498
— traumatic	678	— discharge, cataracts due to	677
Conjunctivo-palpebral echymosis, spontaneous, in severe anæmia	606	— injuries of the eye	677
Conservation of vision... ..	704	— motor, a trephine worked by	669
Convergence, latent, or divergence?	660	— ophthalmoscope	663
Cranial polyneuritis, especially oculo-motor, after treatment by arsenobenzol	255	Electricity in ophthalmic practice	692
Croupous conjunctivitis	622	Elephantiasis, congenital, and infantile glaucoma	364
Crystalline lens, fluorescence of the... ..	544	Elliot's sclero-corneal trephining, some causes of the failure after	640
Cyclic affections of the third nerve	549	Embolie metastases in the eye, pathological anatomy of	743
Cycloplegics with hyoscine, use of, in refraction	182	Emmetropic eye, size of the blind spot in the Endophthalmitis, septic, associated with the diplococcus lanceolatus	411
Cyst formation of the retina	614	Enophthalmos, traumatic, autopsy upon a case of	234
Cystitome, a new cutting	413	Enucleation in cases of panophthalmitis	48
Cysts and holes in the fovea centralis	103	— of the eye for post-traumatic phlegmon, intense meningitis after	48
— traumatic, of the conjunctiva	34	— of the eye under local anæsthesia	624
Dacryocystitis, purulent, bilateral congenital double congenital	297	Epibulbar carcinoma	743
Daltonism, colour vision and	676	— epithelioma, cure of, by the use of X-rays and radium	693
Dazzling, after images due to, and other relationship to dazzling erythropsia	734	— tuberculosis	435
Deafness in sympathetic ophthalmia... ..	109	Epileptic fits induced by the use of eserine sulphate	21
Decompression craniectomy in the papilloedema of the syndrome of intracranial hypertension	114	Epithelioma of the bulbar conjunctiva	34
Dermo-Epithelioma, Parinaud's	369	— of the cornea	34
Dermoid of the eye	743	Erythæmia, ophthalmoscopic signs of	605
Detachment of the Retina	431	Erythropsia, dazzling	734
Development, precocious, in a boy aged eight	552	Eserine solutions, prevention of red colouration in	562
Diabetes insipidus in neuritis and iridocyclitis	605	— sulphate, epileptic fits induced by the use of	21
— retinal lipæmia in	605	Essen-Rhin, eye clinic at the Municipal Hospital at	442
Diabetic cataract	555	Etherisation in eye surgery, new apparatus for	248
Diathermy influence of, on the intraocular pressure	52	Euphthalmine, use of, in nuclear cataracts	440
— ocular, researches on	371	Exophthalmic goitre, acute purulent keratitis in, treated by tarsorrhaphy... ..	456
Dietetic poisoning, visual trouble caused by	357	— treatment of	440
Diplobacillary conjunctivitis, action of salts of zinc in... ..	759	Exophthalmos, unilateral, diagnostic value of in intracranial diseases	357
— notes on an epidemic of	678	— in optic atrophy	612
— vaccine and serum therapy in	371	— leontiasis faciei and,	604
— infection of the eye, therapy of	440	— of Graves' disease and the nose	357
Diplococcus lanceolatus, septic endophthalmitis associated with the	411	Eye, affections of the, Wassermann's reaction in	541
Diploma in ophthalmology of the University of Liverpool	132	— clinics, British and Continental; Some comparisons and contrasts	136
Diphtheria, persistent paralysis of accommodation follows	357	— disease, septic infection in the causation of	416
Diphtheritic conjunctivitis	622	— disease, toxæmia (alimentary and oral) as a cause of	415
Director-forceps for use in partial tenotomy	24	— diseases, gonorrhœal affections in	64
Disc, glaucomatous excavation of the, and optic neuritis	354	— diseases of the, indicanuria in	415
"Drusen", formation of, at the surface of the cornea	353	— procrastination in	443
Duboisine and atropine in the treatment of eye diseases in children	182		
Duck family, comparative morphology of the eye in the	475		

	PAGE		PAGE
Eye, human, case which demonstrates the hardihood of the	443	Glaucoma, secondary injury to the vitreous body as a cause of	234
—human, senile changes found in, the ...	222	—so-called inflammatory valvular action of vorticosc sinus scleral plate, as a cause of	367
—lesions in insular sclerosis	97	— sundry communications on	367
— light and the	734	—trephine, a modified	668
—microscopic examination of the ... 92, 170, 229, 288		—trephining in	523
—movements of labyrinthine origin ...	28	—acute and chronic	580
—work, anaphylaxis in	480	—unilateral, due to congenital malformations	251
Eye bath for the anophthalmic	692	Glaucomatous and normal eyes, investigation of, by Schiötz's tonometer	244
Eye-glasses, oldest preserved	737	—tension of, influence of accommodation and convergence upon the	244
Eyelid retractor, a new	221	—excavation of the disc and optic neuritis	354
—tuberculosis of the	435	—Schnabel's vacuoles and their significance in the development of	354
Eyelids, xanthelasma of the	235	—eye, corneal epithelium of a ...	614
Eyes, diseases of the, bodily temperature of	443	—form of choroidal tubercle ...	434
Fæces and urine, importance of examining the, in eye diseases	692	Glass eye tube	498
Fermentations on the eye and their relation to sympathetic ophthalmia	684	Glasses, radio-active	498
Fever, African recurrent, ocular complica- tion of	604	Gonococcal conjunctivitis epidemic, in Egypt, and its relation with trachoma ...	308
Field of vision	105	Gonorrhæal conjunctivitis aborted by 2 per cent. solution of nitrate of silver... ..	498
Fishes, the light sense of	474	—of the new-born, involvement of the middle ear in	422
Fistula of the lacrymal sac	296	Gonorrhæal infection in eye diseases ...	64
Fluorescence of the crystalline lens Forceps, tarsal cyst	544 733	—inflammation, metastatic	252
Foreign bodies, intra-ocular, sympathetic ophthalmia and	684	—iritis	631
—body in the orbit	159	Gram technique, a simplified... ..	491
—removed from orbit of boy, wound of optic nerve	23	Granulations, superficial cauterisation of ...	371
Fovea centralis, holes and cysts in the ...	103	Graves' disease, exophthalmos of, and the nose	357
Fracture of the skull and lesions following of the optic canal...	625	Groenouw's disease	488
French Ophthalmological Society	452	Guaicol diaphoresis in ophthalmology ...	347
Fundus, anæmic	358	Gumma of the eyelid	753
—changes in myopia, scheme for the exact record of	335	—optic disc	750
—lymphorrhagia of the	621	Gummatous inflammation of the inner canthus Haematoma of the orbit	753 180
—tuberculosis of the	434	Hæmorrhage, expulsive, after cataract extraction	614
Gastro-enteritis in infants, irido-choroiditis following	415	Hæmorrhages, recurrent, into vitreous cured by thyroid extract	20
Gastro-intestinal auto-intoxication a cause of eye trouble	415	—secondary, in the retina, in secondary anæmia	606
Glaucoma, acute, excited by homatropin ...	73	Headache, transient miosis associated with...	605
—Bjerrum method of investigating the field of vision in	105	Hearing, disturbances of, sympathetic ophthalmia and	684
—chronic, modification of Herbert's flap operation for	247	Heidelberg Congress	705
—chronic, of 13 years' standing treated without operation	562	Hemeralopia and xerosis conjunc- tivæ	746
—chronic, operation of combined iridectomy and sclerectomy for	247	—idiopathic, and xerosis con- junctivæ	746
—clinical and pathological aspects of ...	251	Hemianopsia, bitemporal, ætiology of, with reference to diseases of the pituitary body	357
—Elliot's trephining for and its technique	588	—bitemporal, with acromegaly	553
—field of vision in	105	—bitemporal, with evidence of pituitary tumour	552
—infantile, anatomical study on	305	Hemianopia, permanent, following attacks of migraine	606
—infantile, congenital elephantiasis and	364	—unilateral nasal, tabetic atrophy with	605
—internal medication with iodine in... ..	182	Hereditary transmission of retinitis pig- mentosa in two generations	407
—Mayou-Zorab method for operation ...	258		
—Mayou-Zorab operation for	317		
—miscellaneous communications on	251		
—new operative treatment of	539		
—notes on a case covering twenty years	75		
—operations, complications recently met in	398		
— operations for 58, 247, 259, 365			
—pathogenesis of	242		
—patients, blood examination in	368		
—results of Elliot's trephining for	365		

	PAGE		PAGE
Heredo-syphilitic parenchymatous keratitis		Intracapsular extraction of cataract, details of	
after linear extraction of cataract ...	753	vision of 132 cases ...	556, 747
Herpes zoster, ionic medication in ...	372	of the cataractous	
Heterochromia and cataract, relation which		lens ...	747
exists between ...	601	Intracranial diseases, diagnostic value of	
Hexamethylenetetramine in the ocular		unilateral choked disc and	
humours, excretion of ...	53	optic neuritis in ...	357
Histogenetic theory of the vitreous... ..	601	disease, ocular phenonema in	
Histological sections, a new method of		relation to ...	358
bleaching ...	491	surgery, importance of ocular	
"Holes" at the macula ...	103	symptoms in ...	240
Homatropine and cocaine, influence of upon		Intra-ocular coagulation of the aqueous	
accommodation ...	313	humour ...	424
acute glaucoma excited by ...	73	foreign bodies and sympathetic	
Homonymous hemianopsia, incongruous ...	105	ophthalmia ...	684
Hungary, present position of ophthalmology		operations, dressings after ...	632
in ...	517	pressure, influence of diathermy	
Hunterian Lectures on colour vision and		on the ...	52
colour-blindness ...	425	pressure, relations of kerato-	
Hyaline bodies at the optic disc in a case of		conus to ...	490
retinitis pigmentosa ...	716	tension, raised and systematic	
Hyaline nodules in the optic disc in a case of		blood tension, relation	
retinitis pigmentosa ...	19	between ...	350
Hydatid cyst of the orbit ...	628	simple trephining for	
Hydrophthalmos, congenital, pathology and		increase of ...	247
therapy of ...	242	Iodine in corneal ulcer ...	372
with the preservation of		internal medication with, in glaucoma	182
good sight ...	550	Ionic medication in herpes zoster ...	372
Hyoscine, use of in refraction ...	182	Iontophoresis, ocular researches on ...	371
Hyper-activity of anterior lobe combined with		Iridectomy and sclerectomy, combined opera-	
deficient action of posterior lobe ...	553	tion of, for chronic glaucoma...	247
Hypophysis disease (from the ophthal-		peripheral, cataract extraction with	557
mological standpoint) ...	553	Irido-choroiditis following gastro-enteritis in	
Hypophyseal lesion, cerebellar ataxia with		infants ...	415
symptoms, of a ...	553	chronic, discussion on, ...	496
Hypopituitarism, dystrophia adiposa genitalis		essential oils in the treatment of,	406
Hysterical amblyopia, colour fields in ...	105	sympathetic, following cataract	
of dental origin ...	626	extraction, ...	684
Illuminating the field of operation, new		unilateral (serous iritis) treated	
method of ...	443	by subconjunctival injections of	
Immunity ...	479, 613	mercury cyanide ...	572
in ophthalmology, researches		and neuritis, diabetes insipidus in	605
upon ...	613	Iris and ciliary body, angiosarcoma of the ...	353
Indicanuria in diseases of the eye ...	415	and choroid, microscopic examination	
Infarction of the posterior ciliary arteries ...	708	of the ...	170
Infra-nuclear paralysis in abscesses and		atrophy of the, and epibulbar carcinoma	
tumour of the temporal lobes ...	542	associated with xeroderma pigmentosum	357
Infection, contact in carcinoma of the eye ...	202	fibrous tissue formation connected with	
Infective diseases of the eye, influence of anti-		fœtal vascular system, on the surface	
diphtheritic serum on ...	692	of the.....	743
Inflammation, sympathetic, experimental ...	108	human, pigmentation of the ...	234
Inflammations of the conjunctiva ...	678	leproma of, cured by radium therapy...	255
Inflammatory and vascular diseases of the		peripheric incision of the ...	747
choroid ...	118	posterior epithelium of the, in cataract-	
Injuries in the eye caused by light ...	734	ous eyes ...	601
of the eye and sympathetic ophthalmia,		senile changes in the ...	224
relation of lymphocytosis to		Iritis, ætiology of ...	630
syphilis and ...	178	gonorrhœal ...	631
Injuries to the eye by light ...	677	post-operative ...	580
International Congress of Medicine (XVII)		serous ...	372
of Ophthalmology	61	tubercular, double ...	692
(XII)	131	Keratitis, acne rosacea and ...	561
(XII)	572	acute purulent in exophthalmic	
Intestinal auto-intoxication in the patho-		goitre, treated by tarsorrhaphy ...	456
genesis of eczematous kerato-		parenchymatosa ...	719
conjunctivitis ...	415	after injury ...	178
sepsis in ocular affections... ..	415	of traumatic origin,	
Interstitial keratitis ...	255	its medico - legal	
(congenital syphilitic)		aspect ...	753
treated with Salvarsan)	342	heredo - syphilitic,	
influence of traumatism on		after linear extrac-	
the appearance of ...	178	tion of cataract ...	753
injury in the genesis of ...	178	reaper's ...	413

	PAGE		PAGE
Keratitis, suppurative, treatment of ...	561	Lymph-canalicular system ...	95
Kerato-conjunctivitis, eczematous, intestinal auto-intoxication in the pathogenesis of	415	Lymphangioma, cavernous, of the bulbar conjunctiva ...	34
Keratoconus ...	490	Lymphatic stasis and lymphorrhagia...	620
— and ectopia lentis ...	490	Lymphatics of the neck and throat, pathological conditions of the eye secondary to ...	357
— and its relations to intra-ocular pressure ...	490	Lymphocytosis, relation of to injuries of the eye and to sympathetic ophthalmia...	684
Keratomalacia ...	719	Lymphorrhagia of the fundus oculi 620-621	
— prognosis of ...	30	Macula, holes at the ...	103
Keratome, operation for senile cataract with the ...	556	— lutea, microscopic examination of the	233
Labyrinthine origin, eye movements of ...	28	Magdalena, basin of the, endemic ophthalmia of the ...	117
Lacrymal recess, formation of the ...	601	Malaria, optic neuritis due to... ..	605
— affections, ætiology of ...	414	Malformation of the cornea as a stigma of heredo-syphilis ...	617
— diagnosis and treatment of ...	758	Malingerer, visual ...	442
— apparatus, facts old and new about the ...	296	Manchester University, proposed diploma in ophthalmology ...	388
— canaliculi, concretions of the ...	354	Marmoreck, serum of, in the treatment of primary miliary tuberculosis of the bulbar conjunctiva ...	313
— fistula, simulated by primary sporotrichosis of the eyelids ...	485	Maxillary antrum, relation of, to the naso-lacrymal canal ...	601
— gland in surgical anaesthesia ...	482	Measurement of ocular protrusions ...	612
— drainage apparatus, diseases of the passages ...	721	Medico-legal aspect of keratitis parenchymatosa of traumatic origin ...	753
— catheterism of the ...	297	Meibomian glands, adenoma of the ...	632
— excretory disorders of the ...	296	Membranous conjunctivitis ...	622
— obstruction of the ...	296	Meningococcus conjunctivitis ...	75
— sac, blennorrhœa of the ...	296	Mercury cyanide, subconjunctival injections in irido-cyclitis (serous iritis) ...	372
— congenital blennorrhœa of the ...	296	Mesothorium in the treatment of papilloma of the cornea and conjunctiva ...	692
— fistula of the ...	296	Metallurgy, modern, in ophthalmology ...	487
— pneumocele of the ...	296	Metastatic gonorrhœal inflammation ...	252
— polypi, of the ...	297	Methods ...	491
— polypoidal formation in the ...	297	Methyl alcohol, aqueous humour, acute intoxications due to ...	480
— treatment of the ...	296	Microscopic examination of the eye, guide to ...	92, 170, 229, 288
— tuberculosis of the ...	297	Microscopical examination of the eye in choroidal tumour ...	742
— styles, the use of ...	297	Migraine, an optimistic view of ...	498
— suppurative disease, treatment of therapeutics, practical results in ...	297	— permanent hemianopia following attacks of ...	606
Lactation, optic neuritis during ...	38, 605	Miners', coal, nystagmus, visual fields in ...	727
Lamellar cataract and tetany... ..	737	— nystagmus ...	57
Latent convergence or divergence ? ...	660	— ætiology and treatment of ...	175
Leipzig eye clinic, observations on sympathetic ophthalmia at the ...	684	Minto Ophthalmic Hospital, Bangalore ...	386
Lens capsule and cornea, calcareous degeneration of the ...	234	Miosis, transient, associated with headache...	605
— growth of the ...	474	Miscellaneous communications ...	442
— congenital coloboma of the ...	156	Morphology of the eye in the Urinatoridæ (Divers) ...	475
— crystalline, fluorescence of the ...	544	Motor phenomenon of the eye, a remarkable	632
— extraction of in its capsule ...	747	Muscles, external, of the eye, senile changes in the ...	227
— microscopic examination of the ...	170	Myasthenia gravis ...	31
— pathology of the ...	614	Mydriasis due to adrenaline ...	255
— senile changes in the ...	226	Myoclonus, ocular ...	424
— spontaneous complete absorption of the	32	Myopes, retinal, detachment in, cured by simple sclerectomy ...	429
Leontiasis faciei and exophthalmos ...	604	Myopia ...	756
Leproma of iris cured by radium therapy ...	255	— ætiology of ...	756
Lesions of the oculo-motor paths ...	102	— central green patch in ...	756
Leucocytes in the vitreous, extracellular action of the ...	235	— fundus changes in, scheme for the exact record of ...	335
Lids, upper, congenital coloboma of both ...	473	— high grade, and detached retina, new operative treatment of ...	429
Light and the eye ...	734	— high, rupture of the choroid and ...	756
Light, biology of ...	734	— in orbital new growths ...	756
— injuries in the eye, produced by ...	734	Naso-lacrymal canal, relation of to the maxillary antrum ...	601
— rays of, excitability of the retina caused by ...	734		
Lighting, Committee on ...	451		
Ligamentum palpebrarum mediale ...	216		
Limbus, trephining at the ...	247		
Lipoids and white plaques in albuminuric retinitis ...	614		
Lipoid granules in the fixed cells of the cornea	614		
Lipojodin in certain diseases of the optic nerve and in retina ...	693		
Lipomata of the conjunctiva ...	34		

	PAGE		PAGE
National Physical Laboratory... ..	387	Ocular phenomena in their relation to the	
Negative after-images with pure spectral		diagnosis of intracranial disease ...	358
colours	143	— protrusions, measurement of... ..	612
Neoplasms, retro-bulbar, rational surgery of	148	— sporotrichosis	485
Neosalvarsan in the treatment of sympathetic		— symptoms in intracranial surgery ...	240
ophthalmia	692	— syphilis, researches upon	365
— subconjunctival injections of... ..	692	— tension	367
Nernst light, investigation of the eye with ...	734	— increase of, caused by swelling	
Nervous symptoms associated with optic		of tissue colloid	367
atrophy of the familial type	741	— therapeutics, electric colloidal mer-	
— system, eye symptoms, and the early		cury in	498
diagnosis of	605	— tissue, specific properties of	479
Neuralgia, supra-orbital	632	Ocular torticollis	113
Neuritis, acute retrobulbar caused by an		— trauma, bradycardia follows ...	357
intestinal toxæmia... ..	415	— tuberculosis, tuberculin and ...182,	561
— and iridocyclitis in diabetes insipidus	605	Occupational diseases of the eye	443
— following treatment with Salvarsan	440	Oculo-motor paths, lesions of the	102
— optic due to malaria	605	Cedema of the eyelids, ætiology of acute	
— during lactation	38, 605	recurrent	483
— retrobulbar, with amaurosis	606	— of the orbit, recurrent	484
Neuro-retinitis, use of old tuberculin in the		Oils, essential, in the treatment of irido-	
ætiology of	673	cyclitis	406
Neurosis, ocular, pseudo-sympathetic ...	109	Operation, illuminating the field of	443
Nitrate of silver in cases of gonorrhœal		Operations, anti-glaucomatous	365
conjunctivitis	498	— cataract... ..	747
Nodular opacities of the cornea (Groenouw's		— for glaucoma	58, 191, 247, 365
disease)	488	— intra-ocular, dressings after	632
Noguchi and the Wassermann		— new anti-glaucomatous	502
reactions	541	— plastic	650
Noguchi's cutaneous luetic reaction and its		Ophthalmia Egyptian	308
application in ophthalmology	541	— endemic, of the basin of the	
Norfolk and Norwich Eye Infirmary... ..	573	Magdalena	117
Nose and the exophthalmos of Graves' disease	357	neonatorum	59, 422
Notes and Echoes ...59, 130, 195, 319, 382,		— incidence of in	
450, 503, 570, 701		London	422
Novelties 24, 160, 221, 287, 413, 540, 667, 730		— in Hungary	386
Noviform ointment in external ocular		— notification of	385
therapeutics	758	— prevention of	371
Nystagmus, coal miners', visual fields in ...	727	— prophylaxis of... ..	371
— without ophthalmoscopic ab-		— the duty of the	
normalities	721	practitioner in	
Obituary ...130, 195, 319, 382, 450, 503,		cases of	422
570, 701, 767		— sympathetic	684
Ocular affections, cardiovascular disease		— sympathetic, deafness in	109
associated with	415	— experiments on	108
— intestinal sepsis in	415	— in the Leipzig eye	
— complications of African recurrent fever	604	clinic	684
— of aortic aneurism	605	— new observations	
— of the bony diseases of		on	109
Paget	605	— pathogenesis of	108
— diathermy, experiments upon	371	Ophthalmic practice, electricity in	692
— humours, excretion of hexamethy-		— prize for	452
lenetetramine in the	53	— surgery, aseptic, antiseptic and	
— excretion of salicylic acid		prophylactic measures in	372
in the	71	Ophthalmological Congresses of Oxford and	
— injuries, syphilis and	178	Liverpool, 1912... ..	443
— iontophoresis, researches in	371	— Society of the United	
— manifestations associated with acne		Kingdom... ..	134, 322
rosacea	560	Ophthalmology and general	
— of increased intra-		medicine	357, 604, 670, 741
cranial tension, re-		Ophthalmology at the University of Colorado :	
lation of cerebral		degree of doctor	443
decompression to		— autoserotherapy in	562
the relief of	114	— Wassermann's histopin oint-	
— of syphilis and para-		ment in	758
syphilis of the ner-		— in Great Britain, present	
vous system	605	position of	518, 520
— manifestations of tertiary syphilis in		— in India, post-graduate	
tabetics... ..	753	training in	453
— myoclonus	424	— modern metallurgy in	487
— neurosis, pseudo-sympathetic	109	— Noguchi's cutaneous luetic	
— paralysis	606	reaction in	541
— pathology, rôle of syphilis in... ..	313	— present position of	508, 695

	PAGE		PAGE
Ophthalmology, present position of in Canada	513	Orbital affections, rôle of tuberculosis in	606
— present position of in Hungary	517	— conditions, two unusual	466
— prize for	385	— new growths, myopia in	756
— relation of to general medicine	513	Orbito-temporal hydatid cysts	628
— researches upon immunity in	613	Otitis, suppurative, optic neuritis and	632
— significance of scrofuloderma		Ox, fluorescence of the lens of the	544
— in	605	Oxford Diploma in Ophthalmology	571
— study of	453	— Ophthalmological Congress	60, 134, 454
— value of the Wassermann reaction in	541	Paget, bony disease of, ocular complications	
Ophthalmoplegia interna, ætiology of	604	— of	605
Ophthalmoscope Diary 62, 134, 199, 266, 318, 388, 574, 663, 706, 770		Palpebral cysts, anophthalmus with	234
Ophthalmoscopes, self-lit	317	— localisation, Recklinghausen's disease with	605
— self-lit, the use and management of	145	Panophthalmitis, enucleation in the treatment of	48
Ophthalmoscopic, direct, examination with indirect vision and illumination	729	Papilla, solitary tubercle of the	234
— examination by direct method with indirect illumination	193	Papilloedema, bilateral, with scotoma, from sinusitis	105
— signs of erythæmia, "Vaquez's disease"	605	Papilloma of the cornea and conjunctiva, cured by mesothorium	692
Optic atrophy, as a result of soamin poisoning	15	Paralysis, general, optic atrophy in	614
— exophthalmos in	612	— infra-nuclear	542
— in tabes and general paralysis, pathological anatomy of	614	— ocular	606
— of the familial type, nervous symptoms associated with	741	— of the third cranial nerve	549
— tabetic, with unilateral hemianopsia	605	— partial oculomotor, with contractions of muscles supplied by third cranial nerve	549
— unilateral, after exposure to arc light	678	— recurrent third nerve	605
— disc, gumma of the	753	Paraplegia, following injection of arsenobenzol	255
— hyaline bodies at the, in case of retinitis pigmentosa	19, 716	Parasites in trachoma, formations taken for	492
— nerve, affections of the	720	Parinaud's conjunctivitis	120
— and retina, ætiological rôle of tuberculosis in affections of the	498	— a mycotic disease due to a filamentous organism	548
— atrophy of the	25	— etiology of	679
— cavernous degeneration of the	235	— dermo-epithelioma	369
— concretions in the	390	Paris Hospitals	506
— lesions of the, following fracture of the optic canal	625	Pathogenesis of glaucoma	242
— lipojodin in diseases of the	693	Pathological anatomy of embolic metastases in the eye	743
— microscopic examination of the	288	— optic atrophy in tabes and general paralysis	614
— sheaths, fracture of the skull with hæmorrhage into the	625	— the caruncula lacrymalis	614
— tabetic atrophy of the, forms of visual fields in	105	— and bacteriological memoranda	408, 537
— neuritis and suppurative otitis	632	— conditions of the eye, secondary to disease of the lymphatics of the neck and throat	357
— diagnostic value of in intracranial diseases	357	— report on retinitis pigmentosa	408
— during lactation	38, 605	Pathology 234, 305, 353, 614, 742	
— glaucomatous excavation of the disc, and	354	— and treatment of buphthalmos	242
— due to malaria	605	— of rodent ulcer of the cornea	743
— use of old tuberculin in the ætiology of	673	— the lens	614
— with retinitis and consecutive atrophy associated with pregnancy	597	Pemphigus of the conjunctiva	679
— papilla, partial rupture of the	618	Pericorneal syphilitic swelling	753
Ora serrata, microscopic examination of the	233	Perimeter, a hand	540
Orbit, foreign body in the	159	Peripblebitis retinalis adolescentium, tuberculosis in the, ætiology of	435
— idiopathic hæmatoma of the	180	Periophthalmus kolreutheri, the light sense of	474
— recurrent oedema of the	484	Perithelioma of the eyelids	401
— shape of the, its influence upon the eyeball (Stilling's theory)	601	Perlèche and blepharo-conjunctivitis of diplobacillary origin, relationship between	679
— spontaneous hæmatomata of the	180	Phorometer, a near vision	287
— syphilis of the	753	Physiology and anatomy of the eye	601
		Physostol, experience with	693
		Phlegmon, post-traumatic enucleation of the eye for intense meningitis follows	48
		Phlyctenular (eczematous) conjunctivitis, value of tuberculin in	619
		— inflammation of the eye	619
		— ætiology of	674
		Phlyctenulosis	619

	PAGE		PAGE
Pigmentation of the human iris	234	Retina, capillary angiomas of the ...	421
Pituitary body and bitemporal hemianopsia	357	——— cyst formation of the... ..	614
——— disease of the	552	——— detached and high-grade myopia,	
without		new operative treatment of	429
acromegaly	37	——— detached, surgical treatment	
———region, disease in the	552	of	429
———tumour (Lorain type)	553	treatment of	440
with early acromegaly	552	——— detachment of, a new theory in treat-	
adiposogenitalis	552	ment of... ..	432
Plastic operations, some commonplaces with		——— detachment of the	431
regard to	650	——— detachment of the, experimental and	
Pneumocele of the lacrymal sac	296	histological investigations upon	429
Pneumococcal infection of the eye, serum		——— detachment, spontaneous cure of a...431, 432	
therapy of	372	——— excitability of the, by rays of light ...	734
——— infections of the cornea in the		——— lipojodin in certain diseases of the ...	693
rabbit treated by alkaloids... ..	758	——— microscopic examination of the ...	229
——— on the conjunctiva after extir-		——— of the triton and frog, process of	
pation of the lacrymal sac	682	regeneration in the	474
Polypoidal formation in the lacrymal sac ...	297	——— pigment epithelium of the, the secre-	
Polypi of the lacrymal sac	297	tory and nutritive functions of the	601
Posterior ciliary arteries, infarction of the ...	708	——— rare anomaly of the central vein of the	632
Pons-cerebellar angle, tumour of the ...	357	——— secondary hæmorrhages in the, in	
——— tumours of the	605	secondary anæmia	606
Pregnancy, aneurism of the central retinal		——— secondary tuberculosis of the ...	435
artery in the course of	357	——— structure of the ciliary portion of the	601
——— optic neuritis and retinitis and		tuberculous lesions of the	435
consecutive atrophy, associated		Retino-choroiditis (Jensen)	33
with	597	Retinal and vascular changes associated with	
Pressure-massage, myotics, and myopia ...	53	general disease	670
Procrastination in diseases of the eye ...	443	——— arteries, pulsation in the ... 271, 338, 460	
Prophylactic measures for persons about to		——— changes following a fracture of the	
become blind... ..	176	skull	620
——— measures in ophthalmic surgery	372	——— detachment in myopes cured by	
Prophylaxis of ophthalmia neonatorum ...	371	simple sclerectomy	429
Prowazek bodies in the follicles and papillæ		myopic	429
of trachoma	492	——— detachment, treatment of	255
Pseudoglioma	719	with cystic appearance	
Pseudo-membranous conjunctivitis cured by		at the periphery	432
serum	53	——— disease with detachment in a child ...	31
Pseudoneuritis	530	with massive exudate and	
Pseudo-sympathetic ocular neurosis	109	detachment	632
Ptosis: a general review	161	——— lipæmia in severe diabetes	605
Pulsation in the retinal arteries ... 271, 338, 460		——— vessels, arterio-sclerosis of the ...	357
Pupillæ, sphincter, worm-like contractions of		Retinitis, albuminuric	39, 303
the	253	——— lipoids and white plaques	
Purulent ophthalmia of the new-born ...	440	in	614
Radio-active glasses: their action on the eye		——— and optic neuritis and consecutive	
and vision	498	atrophy associated with pregnancy	597
Radium in the treatment of epibulbar epithe-		——— pigmentosa: a pathological report	408
lioma	693	hereditary transmission	
———therapy, in leproma of iris	255	of, in two generations	407
———treatment of spring catarrh	371	——— hyaline bodies at the	
———treatment of trachoma	182	optic disc in case of ... 19, 716	
Reaper's keratitis	413	——— proliferans	20
Recklinghausen's disease with palpebral		Retractor, eyelid, a new	221
localisation... ..	605	Retrobulbar neuritis with amaurosis, caused	
Rectus tendon, lengthening of, in squint		by infective multiple neuritis	606
operations	17	Rheumatic eye affections, relationship of, to	
Refraction and the use of cycloplegics, with		"secondary" tuberculosis	740
hyoscine	182	Rodent ulcer of the cornea, pathology of ...	743
———error of, correction of for micros-		——— treated with CO ₂ snow	562
copic work	442	Rupture of the optic disc	618
———in children, atropin for the deter-		Salicylic acid, excretion of in the ocular	
mination of	759	humours	71
Remedies 51, 182, 255, 313, 371, 440, 498,		Salts of zinc, action of in diplobacillary con-	
561, 692, 758		junctivitis	759
Reptiles and amphibians, rudimentary visual		Salvarsan and neosalvarsan in the treatment	
organs of some	474	of sympathetic ophthalmia	692
——— apparatus of accommodation in ...	474	———in the treatment of interstitial	
Retina, ætiological rôle of tuberculosis in		keratitis (congenital syphilitic)... ..	342
affections of the	498	Salvarsan, neuritis follows treatment with ...	440
		Sarcoma, flat, of the choroid... ..	614
		of the choroid	742

	PAGE		PAGE
Schiötz's tonometer, in the investigation of glaucomatous and normal eyes	244	Staphylomatous leucoma, adherens, trephining the sclero-corneal limbus for	247
—usefulness of	244	Streptothrix, action of, on the eye, with reference to reaper's keratitis	413
Schnabel's vacuoles and their significance in the development of glaucomatous exca- vation	354	Strychnine, action of on the retinal functions of the normal eye	182
Sclera and conjunctiva, tuberculosis of the... ..	435	Sub-conjunctival injections in eye disease	372
"Sclerectome" a further note on the	220	—of mercury cyanide in unilateral irido- cyclitis (serous iritis)	372
a new	160	—of neosalvarsan... ..	692
Scleritis, brawny	2	Sulphate of zinc, action of, on the diplo- bacillus of subacute conjunctivitis	759
Sclero-corneal trephining	324, 484	Supra-orbital neuralgia	632
(Elliot's) on some of the causes of failure after	640	Surgical treatment of detached retina	429
Sclerosis, insular, eye lesions of	97	Swanzy Memorial Fund	704
Sclerostomy	580	Sympathetic affections	108
Sclerectomy and sclerostomy... ..	697	disease following cataract extraction, tuberculin treat- ment of	108
anti-glaucomatous	627	inflammation, experimental	108
oblique, of Prof. Maklakoff and the filtering cicatrix	247	irido-cyclitis following catar- act extraction	684
posterior, superficial crossed	247	ophthalmia and disturbances of hearing	684
simple, in the cure of retinal detachment in myopes	429	and injuries of the eye, relation of lymphocytosis to	684
Sclerotic, method of obtaining a filtering cicatrix of the	247	and tuberculosis	684
trephining the	219	cases observed in the Leipzig Eye Clinic	684
Scotoma by solar eclipse and macular lesion	545	deafness in... ..	109
Scrofuloderma in ophthalmology, significance of	605	developing seven days after opera- tion	498
Senile changes found in the human eye	222	experiments on	108
Sensory pupil reflex in tobacco amblyopia	734	intra-ocular foreign bodies and	684
Sepsis, chronic, influence of upon eye disease	416	new observations on	109
Septic infection in the causation of eye disease	416	pathogenesis of	108
Serum and vaccine therapy in diplobacillary conjunctivitis	371	relation of fermenta- tions on the eye to	684
therapy of pneumococcal infection of the eye	372	treatment of with Salvarsan and Neo- salvarsan	692
used in pseudo-membranous conjunc- tivitis	53	ophthalmitis	684
Sideroscope, a modified	632	pathogenesis of	654
Sight tests of the Board of Trade	319	Synchysis scintillans	663
"Signal" vision test type	667	Syphilis and injuries of the eye	178
Sinusitis, bilateral papillœdema with central scotoma, from	105	ocular injuries	178
Snow, CO ₂ , rodent ulcer treated with	562	traumatism	178
Soamin poisoning, resulting in optic atrophy	15	parasyphilis of the nervous system, ocular symptoms of	605
Spectacles, history of	737	hereditary, malformation of the cornea as a stigma of	617
the invention and discovery of	737	inherited, of the eye, recent investigations dealing with	718
Spectral colours, pure, negative after-images with	143	of the orbit	753
Sphincter pupillæ, worm-like contractions of the	253	ocular, experimental researches upon	365
Sporotrichosis by endogenous infection, experimental study of	354	rôle of in ocular pathology	313
disseminated gummatous	485	tertiary, in tabetics, ocular manifes- tations of	753
ocular	485	Syphilitic affections of the eye	753
primary, of the eyelids simul- lating a lacrymal fistula	485	diseases of the eye, congenital	753
Spring catarrh, clinical, experimental and microscopic studies of	492	swelling, pericorneal	753
radium treatment of	371	Tabes and aneurism of the aorta	605
Squint operations, a phantom for use in the practice of	285	optic atrophy in	614
lengthening a rectus ten- don in	17	Tabetic atrophy of the optic nerve, forms of visual fields in	105
Staining of microscopic specimens	294	optic atrophy with unilateral nasal hemianopsia	605
Staphylococcal infection of the conjunctiva, a rare form of	679		
Staphyloma, congenital anterior	551		

	PAGE		PAGE
Tabetic tertiary syphilis in ocular manifesta- tions of	753	Trephining, technique of Elliot's operation ...	247
Tarsal cyst forceps	733	the sclera	484
Tarsorrhaphy, in the treatment of acute purulent keratitis in exophthalmic goitre	456	sclero - corneal limbus for staphylomatous leucoma adherens	247
Tay-Sachs' disease	108	the sclerotic	219
Teeth and eyes	626	Triton and the frog, process of regeneration	
Temperature, bodily, in diseases of the eye...	443	in the retina of the	474
Tenotomy, partial, director forceps for use in	24	Tubercular disease of the uvea	435
of a lateral rectus to secure		iritis, double	692
vertical deviation	74	Tubercle, solitary, of the papilla	234
Tension, ocular... ..	367	Tuberculin and ocular tuberculosis	56, 182
systematic blood, and raised intra- ocular tension, relation between ...	350	in diseases of the eye	561, 562
Test-type, "signal" vision	667	old, use of in the ætiology of optic neuritis and neuro-retinitis	673
Tetany, lamellar cataract and	737	treatment	255
Therapeutics, external ocular, noviform oint- ment in	758	of sympathetic diseases following cataract ex- traction	108
Thiocyanates in the body fluids	372	value of, in phlyctenular (ecze- matous) conjunctivitis	619
Thyroid extract, in treatment of recurrent hæmorrhages into vitreous	20	Tuberculo-rheumatic uveitis, chronic ...	435
with arsenic and its associated inter- nal secretions in diseases of the eye	440	Tuberculosis	434
Tobacco amblyopia	573	ætiological role of in affec- tions of the optic nerve and retina	498
sensory pupil reflex in	734	epibulbar	435
Tonometer, Schiötz	244	in the ætiology of periphlebitis	
Stephenson-Wolinski	381	retinalis adolescentium	435
Tonometry	244	ocular, treatment of	56
with a description of a tonometer	244	tuberculin and	182
Toxæmia, alimentary	416	of the bulbar conjunctiva	435
(alimentary and oral) as a cause of eye disease	415	conjunctiva and sclera	435
intestinal, as a cause of acute retrobulbar neuritis	415	fundus	434
Trachoma bodies, so-called, conjunctival affections associated with	679	lacrymal sac... ..	297
cell studies in	492	primary miliary, of the bulbar conjunctiva, cured by the serum of Marmoreck	313
clinical, experimental and micro- scopic studies of	492	rôle of, in orbital affections	606
corpuscles	295	secondary, of the retina	435
diagnostic value of the "chlamy- dozoa" of Prowazek and Hal- berstädter in	492	"secondary," relationship of rheumatic eye affections to sympathetic ophthalmia and	740
formations taken for parasites in	492		684
prize, international	386, 705	Tuberculous lesions of the retina	435
Prowazek bodies in the follicles and papillæ of	492	Tumours of the caruncle	35
treatment of, with radium	182	Tumours of the conjunctiva and	
Transplanted amphibian eye, influence of the host on... ..	471	cornea	34
Traumatic conjunctivitis	678	of the pons	605
enophthalmos, autopsy upon a case of	234	pons-cerebellar angle	357
multicocular implantation corneal cyst	268	pituitary	552
Traumatism, influence of, on the appearance of interstitial keratitis... ..	178	Ulcer, rodent, of the cornea, pathology of ...	743
ocular, syphilis and	178	treated with snow, CO ₂	562
Trephine, glaucoma, a modified	668	Ulcus serpens corneæ and intra-ocular pressure	244
worked by electric motor	669	treatment of	371
Trephining at the limbus	247	Urinatoridæ (Divers), morphology of the eye in the	475
(Elliot's) for glaucoma and its technique	588	Urine and fæces, importance of examining in eye diseases	692
modification in... ..	627	Uvea, tubercular diseases of the	435
the tech- nique of	484	Uveal tract, ætiology and course of diseases of the	674
for glaucoma, results of Elliot's	365	Uveitis, tuberculo-rheumatic, chronic ...	435
in glaucoma	523	Vaccine and serum therapy in diplobacillary conjunctivitis	371
acute and chronic... ..	580	immunity of the eye	613
sclero-corneal	324	treatment in infections of the cornea	471
(Elliot's), some cause of failure after	640	Vaccines in eye infections	758
some cause of failure after	585	Vascular and inflammatory diseases of the choroid	118
		and other retinal changes asso- ciated with general disease ...	670
		Vaquez's disease	605
		Vernal catarrh, pathology of	614

	PAGE		PAGE
Vernal conjunctivitis	679	Vitreous immunity	479
Vertical deviation, partial tenotomy of a		——— methods of avoiding prolapse in	
lateral rectus, to secure	74	operating for cataract	747
Vision, conservation of	704	von Hippel's disease	421
——— field of	105	Wassermann's histopin ointment in ophthal-	
Visual acuity, peripheral, and colour sense,		mology	758
relationship between	25	Wassermann reaction	541
——— disorders following direct observa-		——— in case of unilateral	
tion of the last solar eclipse	545	buphthalmos	364
——— fields, forms of, in tabetic atrophy of		——— in ophthalmology... ..	541
the optic nerve	105	Word-blindness, acquired and congenital,	
——— in coal miners' nystagmus	727	treatment of	546
of, studies on the	25	Workman's Compensation Act, 1906	703
——— malingering	442	Worm-like contractions of the sphincter	
——— phenomena, cerebral localisation of		pupillæ	253
some	741	Writing in elementary schools, practical value	
——— troubles caused by dietetic poisoning	357	of upright and sloping	442
Vitreous and zonula, development of in man	601	Xanthelasma of the eyelids	235
——— body, injury to, as a factor in the		Xeroderma pigmentosum, atrophy of the iris	
production of secondary glaucoma	234	and epibulbar carcinoma, associated with	357
——— development of the central canal of		Xerosis conjunctivæ, hemeralopia and	746
the	474	X-Rays in the treatment of epibulbar epi-	
——— extracellular action of the leu-		thelioma	693
cocytes in the	235	Zonula and vitreous, development of in	
——— histogenetic theory of the	601	man	601

THE OPHTHALMOSCOPE.

A MONTHLY REVIEW OF CURRENT OPHTHALMOLOGY.

VOL. XI.—No. 1

JANUARY 1, 1913.

[TWO SHILLINGS.]

CONTENTS.

Original Communications.—

	PAGE
1. F. H. Verhoeff, M.D.—Brawny Scleritis	2
2. Charles Killick, M.D., F.R.C.S.—A Year's Record of Cataract Extraction	11
3. R. H. Elliot, M.D., F.R.C.S.—A Case of Soamin Poisoning resulting in Optic Atrophy	15
4. N. Bishop Harman, M.B., F.R.C.S.—Lengthening a Rectus Tendon in Squint Operations	17

Clinical Memoranda.—

1. Ernest Thomson, M.D.—Hyaline Nodules in the Optic Disc in a case of Retinitis Pigmentosa	19
2. H. Percy Bennett, M.B., C.M.—A Case of Recurrent Hæmorrhages into Vitreous in a young patient (with Retinitis Proliferans), cured by administration of Thyroid Extract	20
3. T. Milnes Bride, M.D.—Epileptic Fits induced by the use of Eserin Sulphate	21
4. Edgar Stevenson, M.D.—Foreign body, three inches long, removed from Orbit of a small boy: wound of Optic Nerve	23

Novelties.—

N. Bishop Harman, M.B., F.R.C.S.—Director-Forceps for use in Partial Tenotomy... ..	24
--	----

Translation.—

Studies on the Fields of Vision with reference to the relationship between peripheral Visual Acuity and Colour Sense, and especially regarding their influence upon the prognosis of Atrophy of the Optic Nerve. By Dr. Henning Rønne... ..	25
--	----

Current Literature.—

I. Eye Movements of Labyrinthine Origin	28
II. Keratomalacia	30
III. Myasthenia Gravis	31
IV. Absorption of Cataract	32
V. Retino-Choroiditis (Jensen)	33
VI. Tumours of the Conjunctiva and Cornea	34
VII. Disease of the Pituitary Body without Acromegaly	37
VIII. Optic Neuritis during Lactation	38
IX. Albuminuric Retinitis	39
X. The Case of "General" Booth	48
XI. Enucleation in cases of Panophthalmitis	48
XII. A new operation for Cataract	49
XIII. Dystrophia Marginalis Corneæ	50
XIV. The Bio-Chemical Reaction of the Lens	51
XV. Remedies	52
Book Notices	53
Correspondence... ..	57
Notes and Echoes	59
The Ophthalmoscope Diary... ..	62

BRAWNY SCLERITIS.

BY

F. H. VERHOEFF, A.M., M.D.

BOSTON, U.S.A.

IN 1897 Schlodtmann¹ described from Fuchs's clinic, under the term "Brawny infiltration of the Sclera and Conjunctiva," a type of anterior scleritis which presented distinctive clinical features. One of his three cases he examined histologically. A case undoubtedly similar had previously been examined by Baumgarten² in 1876, and another by Schirmer³ in 1895, but neither of these observers recognised the fact that their cases differed from the ordinary type of scleritis.

Since Schlodtmann's publication, other cases have been examined histologically by Friedland⁴ (two cases), Uhthoff⁵, Parsons⁶, Prochnow⁷, Oatman⁸, Bietti⁹, and Komoto¹⁰, making eleven cases in all*. Parsons¹² later suggested "Annular scleritis" as a more satisfactory designation for the affection. Tuberculosis, syphilis, and rheumatism have, on clinical grounds, apparently been excluded as ætiological factors, and the cause of the condition has remained obscure. The following case, therefore, in which a positive Wassermann reaction for syphilis was obtained, and which came to histological examination, is of unusual interest †

Case.

Louis B., aged 76, was admitted to the Massachusetts Charitable Eye and Ear Infirmary, May 2nd, 1911. For three years his left eye has occasionally been inflamed for several weeks at a time. There has been no pain until the past few months, during which the eye has been very painful at times.

Fifty years ago, the patient, while a soldier in the Civil War, had a severe attack of malarial fever, which was relieved by quinine. Since then he has been subject to *tic convulsif*. Twenty years ago he was in a hospital for three months, owing to an attack of sciatica in the right leg, and four years ago he had a recurrence of the sciatica. Two years ago he had "inflammatory rheumatism in all his joints." Shortly after this he had a severe attack of facial erysipelas. He denies venereal disease.

Examination.

The patient is somewhat emaciated and feeble, but no more so than would be expected at his age. His radial arteries are greatly thickened. Knee-jerks much diminished. Pupil of right eye reacts normally. Romberg's test negative.

Left Eye.—The cornea is clear but shows fine precipitates on its posterior surface. The bulbar conjunctiva and episcleral tissue are moderately congested and thickened all around the cornea. Above there is a flattened quadrilateral swelling, yellowish in color, corresponding to the insertion of the superior rectus, and on the nasal side a similar swelling corresponding to the insertion of the internal rectus. The pupil, semi-dilated (atropine), shows no definite synechiæ. The lens is slightly cataractous, preventing a good view of the fundus, which however, seems normal. Tension slightly elevated. Vision of left eye, light perception only.

Right Eye.—Lens slightly cataractous, fundus normal; vision, fingers at eight feet. Condition of sclera not noted.

Progress and Treatment.

May 4th, 1911.—Enucleation of left eye, on account of possibility of intraocular tumor.

June 12th, 1911.—Wassermann test positive.

*A case of syphilitic infiltration of the conjunctiva reported by Elschnig¹¹ is not included here, because the condition was evidently acute, only seven weeks duration, the patient only 29 years of age, and there were remains of syphilitic papules over the entire body. Only an excised piece of conjunctiva was examined histologically, so that there was no evidence that the sclera was involved. No doubt the condition was analogous to the early syphilitic lesions of mucous membranes in general. Adolf Alt in his *Text-book* (1880) makes brief mention under "purulent scleritis" of a case which probably was one of brawny scleritis, but insufficient details are given.

†For the opportunity of investigating this case I am indebted to Drs. E. E. Jack and G. S. Derby.

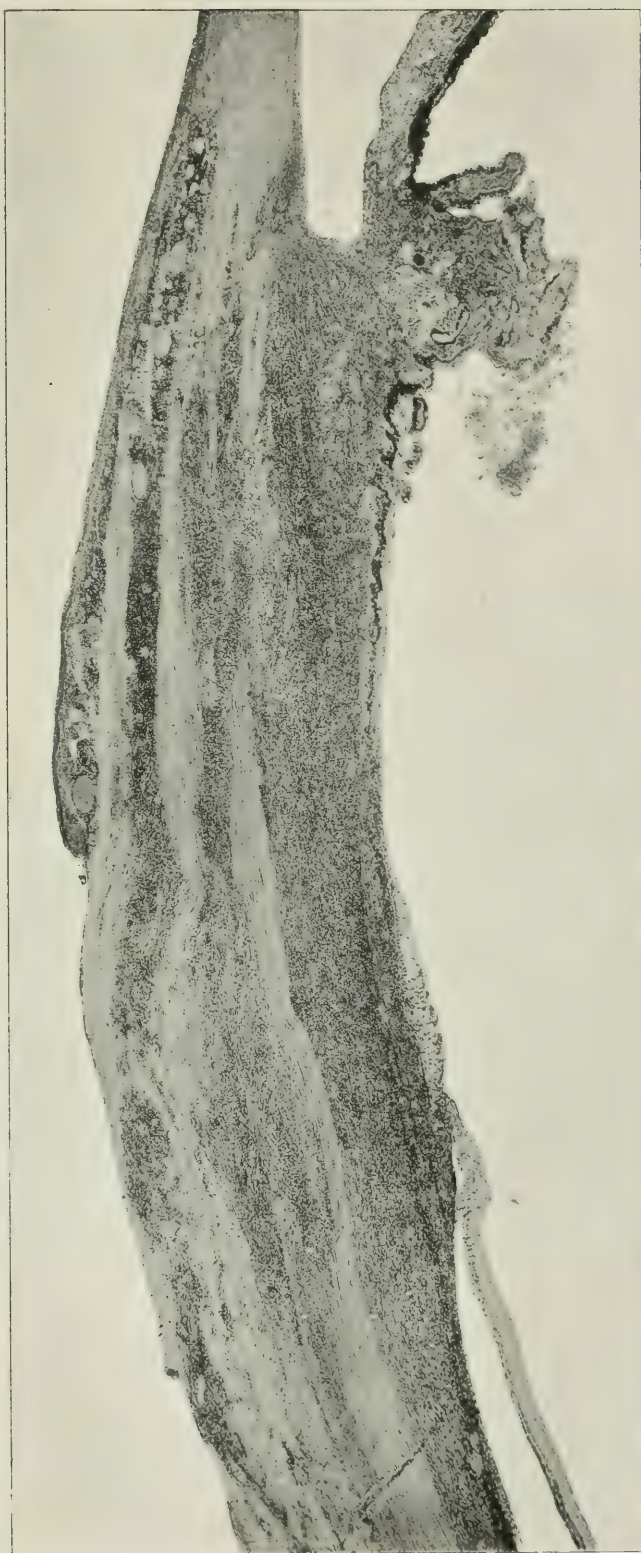


FIG. 1. Brawny scleritis. Section passing through insertion of internal rectus tendon. The sclera is preloaded by granulation tissue and the ciliary body is greatly thickened, due chiefly to infiltration with plasma cells. Magnif. X 20. †

June 23rd, 1912. — The right eye now shows definite, although slight, scleritis. This may have been overlooked at previous examinations. The episclera is moderately congested throughout, and shows two thickened areas at the sites of the superior and internal recti tendons. Otherwise, the episclera is free from infiltration. In the zone of the perforating vessels above, the sclera shows a number of irregular bluish translucent areas, not elevated, the largest measuring about 3 mm. in diameter. The cornea is clear and shows no precipitates. The iris is normal, and the pupil free. The lens is sclerosed, preventing a good view of the fundus; visual field normal; vision, fingers at 10 feet. There is no pain, and the patient is not aware that there is an inflammatory condition of the eye. The patient will not attend the clinic regularly, and also refuses treatment with Salvarsan.

April 3rd, 1912. — Scleritis of right eye about the same, or probably less marked. For past two months right ankle has been painful, causing difficulty in walking. Examination shows very slight pain on pressure about the joint, but no cedema or congestion.

Pathological Examination.

Macroscopical examination. — The globe, 26 mm. \times 26.1 mm. \times 25.75 mm., shows no staphylomata. The cornea is clear. The sclera shows two flattened quadrilateral nodules each about 7 mm. in diameter, one corresponding to the tendinous insertion of the superior rectus, the other to that of the internal rectus. On section, the sclera is seen to be greatly thickened, especially at the sites of these two nodules, where it presents a gelatinous appearance. The ciliary body and anterior part of the choroid are also greatly thickened all around, and gelatinous in appearance. In places there is no line of demarcation between the ciliary body and sclera. There is no cyclitic membrane. The lens, *in situ*, is cataractous posteriorly. The anterior chamber is 2.5 mm. deep, and filled with clear coagulum. The pupil, 4 mm. wide, is free from membrane, but its margins are lightly adherent to the lens all around. The filtration angle is open. The vitreous humour is clear, but is fluid or separated posteriorly. The retina and choroid are *in situ* except just posterior to the ora serrata where the retina shows a slight separation with sub-retinal coagulum. The macula is swollen, and the optic disc seems slightly swollen.

Histological examination. — Fixation in 10 per cent. formalin several days, followed by 10 per cent. potassium bichromate 24 hours. Also numerous pieces of tissue prepared by Marchi's method and by Levaditi's method for spirochetes. Celloidin embedding.

The chief pathological condition involves the sclera and ciliary body (Fig. 1). The anterior portion of the sclera is everywhere involved to a greater or less degree in an inflammatory process, but on the temporal side it is only slightly so. In places it is increased to 1.5 mm. in thickness. The process consists in an invasion by granulation tissue rich in plasma cells. There are many new-formed

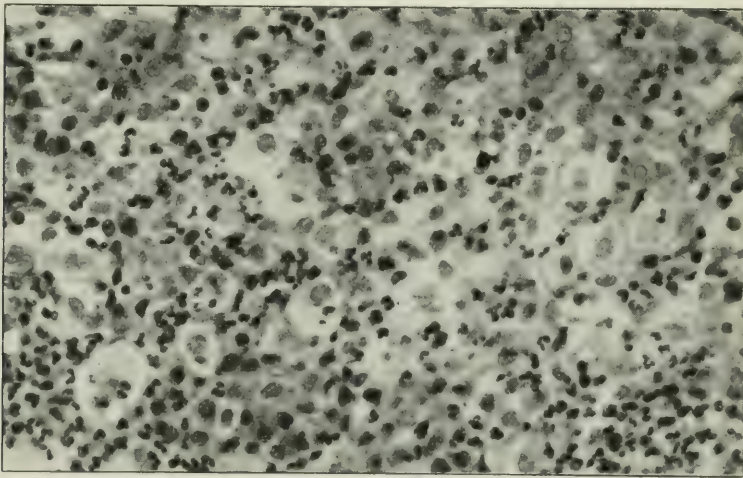


FIG. 2. — Area in sclera infiltrated with pus cells and endothelial phagocytes. The latter contain pus cells and fat. Magni. \times 375.

capillaries, and, as shown by Van Gieson's stain, a considerable amount of new connective tissue. The sclera is irregularly separated into layers and more or less disintegrated. Between the tracts of granulation tissue, long stretches of sclera, free from cells, have undergone hyaline necrosis, evidently due to sequestration. In certain places, notably in the zone of the perforating vessels and beneath the insertions of the recti tendons, there is continuity with the process in the uvea. There is nowhere definite caseation, but within the granulation tissue, well-defined areas of dense purulent infiltration are often seen. The largest of these, 1 to 2 mm. in extent, are found in the deeper layers of the sclera in the vicinity of the superior and internal recti tendons. In these areas there are also numerous

endothelial phagocytes, many of which contain granular *débris* and pus cells in various stages of necrosis (Fig. 2). Except within these phagocytes the pus cells are not necrotic. Frequently the cell bodies of the endothelial phagocytes are swollen and transparent, due, as shown by the Marchi specimens, to their having been filled with fat droplets. At the peripheries of these areas, giant cells, often of the Langhan's type, are not infrequently seen. These are probably foreign body giant cells phagocytizing fat or other products of necrosis.

The scleral involvement reaches along the vessels as far forwards as the ligamentum pectinatum, where it consists chiefly of plasma cell infiltration, but the process does not extend into the cornea. Posteriorly it involves the recti tendons, those of the superior and internal recti especially. The chief inflammatory process does not reach the equator, but over the infiltrated portion of the choroid the inner layers of the sclera show a decided inflammatory reaction.

The episcleral tissue is cedematous and highly congested, the veins and lymphatics especially being greatly dilated. It is densely infiltrated with chronic inflammatory cells, plasma cells predominating. Eosinophiles are particularly abundant here. The blood vessels here do not show endovasculitis, and there is no proliferation of tissue cells. At the limbus the tissue is likewise congested, but shows relatively slight cellular infiltration.

The ciliary body throughout shows a dense cellular infiltration which increases it two to three times its normal thickness. The infiltrate splits apart the muscle bundles and is continued backward into the choroid, where it gradually assumes a discrete perivascular character. It is composed almost exclusively of plasma cells, but there are here and there small relatively discrete areas of lymphocytes. Many of the plasma cells show colloid degeneration. Associated with the infiltration, there is considerable proliferation of the stroma cells which, however, is masked by the plasma cells, and might readily be overlooked. There is no necrosis, but special staining shows a slight amount of fibrin in places. Giant cells and endothelial phagocytes are almost never seen, but in one section three typical Langhan's giant-cells are found close together in the midst of an area of lymphocytic infiltration. In Marchi specimens many of the chromatophores are found filled with fat droplets. New-formed blood vessels are few in number. Many of the original vessels, notably the circulus iridis major, show marked peri- and endarteritis. Cellular exudation from the surface of the ciliary body is slight, and is most marked in the region of the ora serrata. It consists chiefly of large lymphocytes and plasma cells. There is no formation of cyclitic membrane. In one place the unpigmented layer of the pars ciliaris retinae is lifted up by serum in the form of a small cyst. The inflammatory process in the ciliary body, thus differs strikingly from that in the sclera, in that the infiltration with plasma cells is much greater while the proliferation of tissue cells is much less.

The cornea is normal, except that on and within the endothelium there are numerous small clumps of cells consisting chiefly of lymphocytes and plasma cells. The filtration angle is freely open, but the ligamentum pectinatum is infiltrated with cells. The iris is not atrophic, and is relative to the ciliary body, only slightly involved in the inflammatory process. It is, however, diffusely infiltrated with plasma cells, and shows occasional nodules of small lymphocytes. It is not cedematous or appreciably increased in thickness, and there is no formation of pupillary membrane. Special staining shows a slight amount of fibrin over its anterior surface in places, especially at the pupillary margin.

The optic disc seems normal, although possibly slightly swollen. Around it, the retina is slightly separated by serous coagulum. The nerve stem (myelin stain) shows marked atrophy, except in the macular bundle which is only slightly affected.

The retina takes almost no part in the inflammatory process. Immediately behind the ora serrata it shows marked localized gliosis. Beneath the infiltrated choroid, from which it is separated by coagulum, it shows atrophy, most of the multipolar ganglion cells having disappeared, and slight perivascular infiltration with plasma cells. Posterior to the equator, it is not separated except in the macular region, where there is a localized separation. Except for a slight oedema, most evident in the macula, the retina over the fundus appears almost normal. The multipolar ganglion cells here are still present, but show degenerative changes.

The choroid, except anterior to the equator, where, as already noted, it is markedly infiltrated with plasma cells, is almost normal. It is, however, everywhere congested, and even over the fundus shows slight perivascular infiltration with plasma cells.

The retinal and central retinal vessels, the choroidal vessels, and the posterior ciliary vessels show practically no endovasculitis, in spite of the advanced age of the patient. All the ciliary nerves seen appear normal.

Bacteriological examination.—Sections stained for tubercle bacilli give negative results. Sections stained by the Gram-Weigert method, and with thionin, also show no micro-organisms. Numerous pieces of tissue, including areas of purulent infiltration and necrosis, stained by Levaditi's method, fail to show spirochaetes after the most careful search.

Remarks.

Clinically, this case, in the advanced age of the patient (76 years), the diffuse character of the scleritis, its prolonged course and unfavorable outcome, and the relatively slight ophthalmoscopic evidences of intraocular involvement, conformed to the cases of Brawny Scleritis previously described. The occurrence of the two scleral nodules was perhaps somewhat atypical.

but, apparently, similar nodules were observed in the cases of Friedland,⁴ Oatman,⁸ and Komoto.¹⁰ These nodules, however, differed greatly in appearance from those of the ordinary anterior nodular scleritis, being flattened and quadrilateral in shape, and were found, on pathological examination, to be the infiltrated tendons of the superior and internal recti muscles. Strictly speaking, therefore, they were not scleritic nodules at all. It is noteworthy that the right eye, which later was found to be slightly affected, also showed similar, but much smaller, nodules at the sites of the same tendons.

Histologically, the essential changes consisted in an invasion of the anterior portion of the sclera and recti tendons with granulation tissue richly infiltrated with plasma cells, and a diffuse plasma cell infiltration of the ciliary body and anterior part of the choroid. There were a few giant-cells and also areas of fatty degeneration infiltrated with pus cells and endothelial phagocytes, but no definite caseation. There was marked peri- and end-arteritis. These changes seemed so strongly indicative of syphilis that I suggested the advisability of the Wassermann test, which proved positive.

Through the courtesy of Professor Fuchs, Mr. Parsons, and Dr. Oatman, I have sections of four previously reported cases directly to compare with my own. The sections sent me by Professor Fuchs, were from Schlodtmann's case and Friedland's Case I. I find that the changes in the latter two cases are essentially similar to those in mine, differing only in degree. Thus, in Friedland's case the proliferation of tissue cells has gone on to the production of much new fibrous tissue, in which large areas of caseation and numerous giant-cells occur. The caseation possibly represents a later stage of the areas of fatty degeneration and purulent infiltration seen in my case. In Schlodtmann's case there is less fibrous tissue than in Friedland's, less caseation, and fewer giant-cells. Peri- and end-arteritis are marked in both cases. In these cases, as in mine, the ciliary body and choroid are densely infiltrated. This was so in most of the other reported cases also, and the fact seems especially noteworthy that in spite of this intense uveal involvement, there was no tendency to the formation of cyclitic membrane in any of the cases.

None of the previous observers states the exact character of the infiltrating cells. I find, however, that in Schlodtmann's and Friedland's cases, just as in mine, they are almost exclusively plasma cells, a fact that accords with a possible syphilitic origin.* In Parson's and Oatman's cases plasma cells predominate, but there is a relatively large proportion of lymphocytes, due no doubt to the earlier stage of the process.

Parson's and Oatman's cases are especially important on account of the early stage of the scleritis and the slight involvement of the uvea. In the former the scleritis was not noted clinically, and the eye was removed on account of advanced glaucoma, which, however, was evidently independent of the scleritis. The section that I have shows that the infiltration is confined almost exclusively to the episcleral tissue except at the insertion of one of the recti tendons, where it extends fairly deep. At this place, and here only, there is well marked proliferation of tissue cells and an area of purulent infiltration similar to those in my case. There is slight infiltration along the anterior perforating vessels, and the cornea is slightly infiltrated at the periphery. Parsons did not note any infiltration of the uvea, but examination of my section of his case with special reference to this point, shows perivascular

*Strangely enough, in spite of the highly distinctive appearance of plasma cells, only within recent years have ophthalmic pathologists begun to distinguish them from ordinary lymphocytes.

infiltration throughout the choroid. This is not readily seen owing to the great thinning of the choroid resulting from formalin fixation.*

In Oatman's case the scleritis was also not recognized clinically. In this case, too, there was chronic glaucoma apparently independent of the scleritis, and the eye was enucleated on account of a traumatic rupture of a staphyloma. In the two specimens that I have of this case, the plasma cell infiltration is chiefly confined to the episcleral tissue and recti tendons, but it also extends into the sclera along the vessels. In places it is entirely perivascular, and nowhere is it associated with proliferation of tissue cells or necrosis. The choroid shows well-marked perivascular infiltration with lymphoid and plasma cells. I am unable to make out in these sections the changes in the ciliary nerves described by Oatman.†

Uththoff discusses at length numerous small sharply-defined areas occurring mostly in the conjunctiva of his case, and closely resembling trachoma follicles. These were also noted by Komoto in his case. I fail to find such areas in the above specimens, possibly due to the fact that an insufficient amount of conjunctiva was included. Uththoff thought that on account of the presence in their centres of larger cells with pale nuclei, these areas were not lymph follicles, but I regard this as the best reason for identifying them as such, for the central cells no doubt represented the undifferentiated lymphocytes of germinal centres. Lymph follicles, are, of course, frequently seen in the vicinity of syphilitic lesions. Uththoff also laid great stress on the occurrence of œdema in the episcleral tissue. While this is undoubtedly present in Brawny scleritis, it is notably slight in comparison with the amount of œdema I have found over the active foci of anterior nodular scleritis.¹⁵

The question as to whether the scleritis or the uveitis was the primary condition was not discussed by Schlodtmann, while Friedland took the view that they were independent of each other. He based this chiefly on the fact that in one of his cases the scleral involvement did not exactly correspond with, although it overlapped, the choroidal infiltration. Uththoff, as had Baumgarten, concluded that the uveitis was secondary to the scleritis, because clinical evidences of intraocular involvement did not occur until long after the scleritis had become marked. This argument, however, is not conclusive, because even with marked intraocular involvement, as in my case, the clinical evidences of it may be slight. The cases of Parsons and Oatman seem to me to prove conclusively that the sclera is first involved; for in each of these the intraocular infiltration was insignificant compared to the episcleral, and, probably, simply represented a reaction at the distance. The fact, also, that in my case the sclera showed marked tissue proliferation, while the episclera and uvea showed chiefly plasma cell infiltration, is alone almost sufficient to prove that the scleral process was primary. It is noteworthy in this connection that the second eye in my case, which was in a very early stage of the disease, clinically showed no infiltration of the episclera, but simply involvement of the sclera proper in the zone of the perforating vessels and thickening of two of the recti tendons. Further, there is some reason to believe that the essential process in the sclera begins at the insertions of one or more of the recti tendons, and from there involves the episclera in a chronic inflammatory reaction, and then penetrates the sclera and involves the uvea.

* This thinning of the choroid is not due, as generally supposed, chiefly to pressure of the vitreous, for I have found that it can be almost entirely obviated by placing the formalin hardened globe in a ten per cent. solution of potassium bichromate for 24 hours and washing. The subsequent treatment with alcohol then does not cause the tissues to contract as it does after simple formalin fixation.

†Dr. Oatman informs me he no longer holds the view that Brawny Scleritis is due to some trophic nerve disturbance.

For in both Parson's and Oatman's cases, as well as in mine, the process was most marked at the insertions of some of these tendons, and in Komoto's case, judging by his illustration, the large nodule he describes is apparently due to involvement of a tendon.

As to the ætiology of Brawny scleritis, the positive Wassermann reaction in the present case, and the histological findings in all the reported cases, strongly suggest syphilis as the causative factor. The histology of the lesions certainly excludes tuberculosis, and is not characteristic of any known infection, but is perfectly consistent with a late stage of syphilis. The failure to find spirochætes in the present case, in spite of the most careful search, is not surprising, in view of the prolonged and sluggish course of the disease. Syphilis, it seems to me, must at least be assumed as the cause, and the cases be treated on this assumption until contrary evidence is forthcoming.

It is noteworthy that in none of the reported cases, so far as I can ascertain, has adequate anti-syphilitic treatment been carried out. Such cases, however, probably would be resistant to ordinary treatment, but it is possible that they would react favourably to Salvarsan. If this should prove true, it would afford additional proof of their syphilitic nature. In the present case the patient, unfortunately, refused to submit to this treatment.

In view of the fact that the manifestations of syphilis are notoriously diverse, it is perhaps profitless to attempt to explain the special character of the lesions in Brawny Scleritis. How highly special is this character is shown by the fact that not only are both eyes almost always involved, but in the same way. In this connection the advanced ages of the patients are suggestive, for it seems possible that the relative immunity which follows syphilitic infection acquired late in life, may have a special character which modifies the later lesions. This explanation does not preclude the possibility that exceptionally the condition may be found to occur in younger individuals, because it is conceivable that under certain conditions the same type of immunity may develop in them. As a matter of fact, while in the majority of the reported cases the ages have been between 60 and 75, in the cases of Bietti, Komoto, and Oatman, the ages were respectively 46, 47, and 54 years. As an analogy for the condition, syphilitic periostitis suggests itself.

The question arises as to whether or not posterior scleritis, a few cases of which have been described, is of the same nature as Brawny Scleritis. The cases upon which this diagnosis has been made upon purely clinical grounds, of course are inconclusive, because it is possible that they were not primarily cases of scleritis. Only two cases have been examined histologically—one by Wagenmann¹³ and one by Coats.¹⁴ In Wagenmann's patient, aged 54, the lesion was essentially similar to that of Brawny Scleritis, as Wagenmann himself points out, and occurred at the site of the insertion of the inferior oblique tendon, a fact possibly of some significance. There does not seem much doubt, therefore, that Brawny Scleritis may attack the posterior pole of the eye. In Coats' case the patient was aged 38 years, and there was a large area of necrosis, relatively free from infiltration, involving the sclera, choroid, and retina, while the surrounding tissues were infiltrated with mononuclear cells. Coats regarded the condition as an infarct due to obstruction of a posterior ciliary artery. Judging by a section of this case, kindly sent to me by Mr. Coats, this explanation seems most probable.

The literature on the subject of scleritis shows that great confusion has hitherto existed not only as regards its clinical features, but its pathology and ætiology as well. This no doubt is in part due to the fact, unfortunately true of diseases in general, that in individual cases it is not always easy to

differentiate clinically between the different types, and in part to the fact that almost all the cases examined histologically have been of Brawny Scleritis, whereas anterior nodular scleritis is far more common. In previous communications^{15, 16} I have brought forward evidence to show that anterior nodular scleritis is due to tuberculosis. If my conclusions are correct, it may now be stated that there are two chief types of scleritis, tuberculous or anterior nodular scleritis (or episcleritis), the common type, and syphilitic or Brawny Scleritis, which is relatively uncommon. If, in addition, we include under scleritis, gumma of the sclera and ciliary body, leprous scleritis, and episcleritis periodica fugax, we have classified all the types of scleritis which may occur, except, conceivably, under very unusual conditions. It is perhaps well to point out here, that a condition frequently mistaken for episcleritis, or sclero-keratitis, is the neuropathic conjunctivitis described by me, which occurs under the same conditions as facial herpes¹⁷.

Assuming that the two chief types of scleritis are due respectively to tuberculosis and syphilis, it may be of interest to compare the two conditions more in detail. In the first place, anterior nodular scleritis occurs almost always in young individuals, Brawny Scleritis in old. Clinically, the two conditions may sometimes be so similar as to be mistaken for each other. Thus, Brawny Scleritis may appear nodular, owing to infiltration of the recti tendons, while nodular scleritis, after partial subsidence of the nodules, may take on a fairly uniform appearance. In Brawny Scleritis, corneal involvement always occurs by direct extension from the sclera; in nodular scleritis, it may, in addition, occur in the form of discrete metastases. Histologically, in Brawny scleritis the inflammatory process is diffuse, associated with the formation of granulation tissue, showing in the later stages areas of necrosis. In nodular Scleritis the process consists chiefly in focal proliferation of epithelioid cells without necrosis.* In Brawny Scleritis the associated involvement of the ciliary body is diffuse, interstitial, does not lead to formation of cyclitic membrane, and is secondary to the scleritis. In nodular scleritis, the cyclitis, when present, is focal, superficial, associated with membrane formation, and is primary to or independent of the scleritis. In Brawny Scleritis the process extends by continuity, hence its diffuse character. In nodular scleritis the infection reaches the sclera chiefly by metastasis from the filtration angle¹⁶; hence its focal character.

Conclusions.

Brawny Scleritis is a distinct type of scleritis, differing essentially in both its clinical and histological aspects from anterior Nodular Scleritis. Clinically, it is characterised by the advanced age at which it occurs (usually over sixty), its insidious onset and extremely chronic course, and the diffuse congestion and thickening of the sclera and episclera without the formation of definite nodules. The infiltrated recti tendons, however, may simulate scleritic nodules. Ultimately, the anterior part of the sclera becomes involved around its entire circumference and the process also invades the cornea. Evidences of intraocular involvement, such as vitreous opacities and iritis, occur late and are relatively slight. Pain likewise does not occur until late. The intraocular pressure is normal or elevated. Both eyes are usually affected, although not always simultaneously, and the disease usually leads to blindness in one eye at least.

Histologically, in the early stages there is found a diffuse plasma cell infiltration of the sclera and episclera. Later, or possibly at the same time,

* In rare cases breaking down of the nodules has been observed clinically. I have seen a few such cases.

the sclera becomes pervaded by granulation tissue, the plasma cell infiltration increases and involves by continuity, first, the anterior part of the choroid and ciliary body, and, finally, the whole uvea. Necrosis of the granulation tissue takes place, showing itself as areas of purulent infiltration containing numerous endothelial phagocytes filled with fat, or as well-marked caseation. Giant-cells may or may not be numerous. Peri- and end-arteritis are marked in the affected tissues. Even in the advanced stages, where there is intense infiltration of the ciliary body, there is no formation of cyclitic membrane. Separation of the retina ultimately occurs, due to exudation of serum from the choroid.

The character of the lesions in Brawny Scleritis strongly indicates a syphilitic origin for the affection. This is also indicated by a positive Wassermann reaction obtained in the present case, but until such reactions have been obtained in a number of cases, or spirochaetes have been demonstrated in the lesions, it cannot be regarded as absolutely established that Brawny Scleritis is a manifestation of syphilis.

REFERENCES.

1. **Schlodtmann, W.**—"Ueber sulzige Infiltration der Conjunctiva und Sklera." *Arch. f. Opth.*, 1897, Heft i, S. 56.
2. **Baumgarten.**—"Ein Fall von sklerosirender Keratitis." *Arch. f. Opth.*, 1876, Heft ii, S. 185.
3. **Schirmer.**—"Zur pathologischen Anatomie der Skleritis und Episkleritis." *Arch. f. Opth.*, 1895, Heft iv, S. 158.
4. **Friedland.**—"Zur pathologischen Anatomie der Skleritis." *Arch. f. Opth.*, 1899, Heft ii, S. 283.
5. **Uhthoff.**—"Weiterer Beitrag zur pathologischen Anatomie der Skleritis." *Arch. f. Opth.*, 1900, Heft iii, S. 539.
6. **Spicer and Parsons.**—"Vessels of new formation on the anterior surface of the iris, etc." *Trans. Opth. Soc. United Kingdom*, 1902, p. 306.
7. **Prochnow.**—"Zur Klinik und pathologischen Anatomie der sulzigen Skleritis." Inaug. Diss. Greifswald, 1902. Nagel's *Jahresbericht*, 1903, S. 214.
8. **Roosa and Oatman.**—"A case of unilateral annular scleritis." *The Post-Graduate*, March, 1905.
9. **Bietti.**—"Sull' anatomia patologica della sclerite e delle sue complicazione." *Annali di Ottalmologia*, 1908, p. 178. (Nagel's *Jahresbericht*, 1909.)
10. **Komoto.**—"Beitrag zur pathologischen Anatomie der Skleritis." *Klin. Monatsbl. f. Augenheilk.*, 1909, S. 751.
11. **Elschnig.**—"Syphilitische Infiltration der Conjunctiva Bulbi." *Klin. Monatsbl. f. Augenheilk.*, 1897, S. 155.
12. **Parsons.**—"Annular scleritis." *Ophthalmic Review*, 1902, p. 181.
13. **Wagenmann.**—"Zur Kenntnis der Scleritis posterior." *Bericht. der Ophthal. Gessellschaft*, Heidelberg, 1903, S. 140.
14. **Coats.**—"Posterior scleritis and infarction of the posterior ciliary arteries." *Trans. Opth. Soc. United Kingdom*, 1907, p. 130.
15. **Verhoeff.**—"Tuberculous scleritis, a commonly unrecognised form of tuberculosis." *Boston Med. and Surg. Journ.*, 1907, p. 317.
16. **Verhoeff.**—"The histologic findings in a case of tuberculous cyclitis, and a theory as to the origin of tuberculous scleritis and keratitis." *Transactions American Ophthalmological Society*, 1910.
17. **Verhoeff.**—"Neuropathic keratitis and some allied conditions." *Journ. Amer. Med. Assoc.*, July 17th, 1909.

A YEAR'S RECORD OF CATARACT EXTRACTION.

BY

CHARLES KILICK, M.D., F.R.C.S.

HON. SURGEON KENT COUNTY OPHTHALMIC HOSPITAL, MAIDSTONE, ENGLAND.

IN this paper it is my intention to describe a few points in connection with the extractions performed during 1911 at the Kent County Ophthalmic Hospital. The series, which only comprises cases in which the lens was removed as a whole at one sitting, includes 69 primary extractions and 7 secondary. The ages of the patients varied as follows:—

40—50	...	...	...	...	8 cases.
50—60	...	...	...	...	12 „
60—70	...	...	...	...	30 „
70—80	...	...	...	...	23 „
Over 80	...	...	...	...	3 „
TOTAL ...					76 „

The method adopted is the combined operation, *i.e.*, cataract extraction with iridectomy. I do not regard preliminary iridectomy with favour, and but seldom perform it except for some special reason. It is a good rule never to operate upon an eye oftener than is absolutely necessary, and a long experience of cataract work has convinced me that in the great majority of cases preliminary iridectomy is unnecessary, and, indeed, is hardly justifiable. It is true that eyes tolerate operation, even when performed by inexperienced hands, extremely well. Nevertheless it should be a cardinal principle that the less traumatism inflicted upon a delicate organ the better for the patient. Moreover, preliminary iridectomy, in my opinion, only rarely justifies the main claim that is made for it, namely, that it hastens the maturation of a cataract. It failed to do so in the case of two patients in my series (Nos. 43 and 47). The former had a shrunken, useless right eye, his left being affected with immature nuclear cataract. He was unable to work, and had drifted into the Poorhouse. Thinking that he might perhaps see a little better if iridectomy were done, I operated. Vision, however, being in no way affected either for better or worse, I decided, six weeks later, to remove the lens. The second operation was difficult, as the patient was extremely nervous, the wound, too, healed slowly and required firm pressure for some time. Ultimately, he made a good recovery, and has 6/12 vision at the present time. The delayed healing, as is sometimes the case, is responsible, however, for considerable post-operative astigmatism, and he has to wear a $\frac{+8}{+6 \text{ 180}^\circ}$ glass to see as well as he does.

In the case of a second patient (No. 47) preliminary iridectomy had been performed by Professor M. McHardy four years previously, in order to hasten the maturation of the cataract, but without any material effect. Thus, in each of these cases it would, in my opinion, have been easier to do the extraction with iridectomy at one sitting, and so to have saved the patient a great deal of time, pain, and worry.

Into the controversy, if there still exists any doubt about the matter as to which is the operation for choice, the combined or the simple operation, *i.e.*, cataract extraction with iridectomy as against cataract extraction without iridectomy, I do not intend to enter, as I always perform the former. It has the one great merit, which outweighs all others, of absolutely eliminating prolapse

of iris. In the series under notice this dreaded complication did not once occur, although, be it noted, my patients walk from the operating theatre back to the ward, which in the case of women means that a considerable distance has to be traversed, including a long flight of stairs. The only complication, if it really deserves such a name, is the tendency which undoubtedly exists for one, or sometimes both, of the pillars of the iris bounding the coloboma to become adherent either to scar or to cornea. It is, therefore, of the greatest importance to smooth each pillar into its correct position before concluding the operation, a matter by no means always easy of accomplishment. As a further means of guarding against adhesion, I always instil eserine before the final closure of the eyes, although the drug does not appear to exert as much influence as might be desired upon the damaged sphincter.

The selection of patients for operation must depend entirely upon the circumstances of each case, and no hard and fast rule can be laid down. In many it is impossible to wait until the cataract is fully matured, and more especially is this so when dealing with one-eyed people or with the labouring classes. My rule is to operate irrespective of ripeness as soon as the patient's ability to perform his usual occupation is markedly impaired; of course, if one eye is not affected or very slightly affected with cataract, one can afford to wait till the most favourable moment before operating upon the other. It is, however, a perfectly safe and easy matter to remove an unripe cataract, as all surgeons of experience will agree, the only complication of importance, namely, after-cataract, being dealt with later on.

The patient is prepared for operation in the usual way as far as antiseptic precautions are concerned. These should be effective, but at the same time as simple as possible, and having lost but two eyes from suppuration after cataract extraction in ten years, I have naturally every confidence in my own method. The patient is usually admitted a day or two before operation, any conjunctival catarrh is treated by suitable remedies, and lacrymal obstruction, if present, dealt with by the ordinary methods short of extirpation of the sac; it has never been necessary so far to resort to this. Provided that the lids are free from stickiness and the conjunctivæ appear smooth and healthy-looking, extraction may be undertaken without fear. On the operation morning the neighbourhood of both eyes is well washed with soap linament followed by the application of 1:4000 perchloride of mercury lotion. The eye for operation is then covered with a single piece of lint soaked in 1:1000 sublimate solution, lightly held in position by a single turn of a gauze bandage. One hour before operating, a drop of eserine (grs. ij. ad ʒj.) is introduced, followed by three instillations of adrenalin (1:4000) and cocaine (gr. xx. ad ʒj.) at intervals of a quarter of an hour. All drops and dressings have previously been sterilised. Just before beginning to operate, the eye is douched for a few moments with warm perchloride of mercury (1:4000) and, finally, the residue of this fluid, together with any little flakes of mucus having been wiped away, a final drop of cocaine is instilled.

All instruments, with the exception of knife, scissors, and cystitome, whose edges would be spoilt by too long immersion, are boiled for five minutes in a weak solution of sodium carbonate (ʒij ad O viij), the cutting instruments are then boiled for one minute. All are then transferred to a porcelain dish, previously swabbed with carbolic acid (1:20) and rinsed well with boiled water. The vessel is then partly filled with the same fluid. It will be noticed, therefore, that no test dressings are used, nor are the eyelashes cut short before operating.

For cleansing the hands, I rely solely upon the liberal use of soap, water,

and nailbrush, no antiseptic whatever being employed; a clean, but not sterilised, towel is provided for drying. I make use of no veils, aprons, mouth protectors, or any of the modern armour which many surgeons at the present day seem to think indispensable, nor has their use, in the almost complete absence of suppuration, as previously mentioned, been shown to be necessary.

With regard to the operation, the following points appear to me to be the most important.—A large corneal section, including, for preference, a conjunctival flap of moderate size, should be fashioned and should equal from two-fifths to one-half the cornea. Experience teaches that it is better to err on the safe side and make an ample opening through which the lens can readily escape, rather than run the risk of losing vitreous in the endeavour to expel it through an insufficient aperture; indeed, if this initial mistake has been made, it is better to enlarge the wound with scissors rather than use undue force. If the eye is unusually prominent, the speculum can easily be dispensed with altogether if one so desires, but, as a rule, its employment will be found useful as it enlarges the field of operation and acts as an additional assistant. With nervous patients, however, it is well to remove it after completing the section, or at any rate after the iridectomy. The second point of importance concerns the amount of iris which should be cut away. If too much, a disfiguring coloboma is the result; if too little, the tendency of adhesion of pillars comes in. It is a matter of experience in judging the exact amount which should be excised. The third and last point is to attend to the toilette of the wound with the utmost care, and, as has already been noted, to be sure that the iris is restored to its proper position before closing the eye.

Having completed the operation, the lids are sealed with boric ointment, a binocular dressing of Gamgee tissue is applied, and the patient is conducted back to bed. More or less severe pain may be expected shortly afterwards, but this passes away after a few hours. Occasionally, there is a free discharge of tears, necessitating the frequent use of the pocket-handkerchief. Should all be well, the eye is inspected on the third day, the patient is allowed to get up on the fourth or fifth, and discharge from Hospital occurs from ten to fourteen days after operation. Glasses are prescribed some four weeks later.

Complications.—Escape of vitreous is the most important. This accident, should it occur, ought never to be the surgeon's fault, because experience should teach him the requisite caution and dexterity in order to avoid it in all normal cases. In the series under notice, loss of vitreous occurred three times. Nos. 20 and 63 were operated upon by the house-surgeon, his first experience of cataract extraction; in each case I had to intervene and to complete the operation with the vectis. Both patients fortunately made tedious but good recoveries, and the former has excellent sight at the present time. For the third example, No. 68, I must blame myself partly for the loss of vitreous which occurred. The case was that of an old man, aged 80. The right eye was shrivelled up, having undergone, I believe, an unsuccessful extraction elsewhere. He squeezed the moment the section was made upon the left eye and forced out the lens together with a large quantity of vitreous. The wound healed, but no sight was restored. I think that, in his case, it would have been wiser, although certainly more difficult, to operate without a speculum.

Iritis was responsible for one lost eye also. No. 69, an old man of 76. Successful extraction was followed by quiet and almost painless iritis with small hypopyon, resulting after a tedious convalescence, in a closed pupil.

Thus, of the sixty-nine primary extractions which were performed throughout the year, two were totally unsuccessful—one from loss of vitreous

and one from irido-cyclitis; the rest, regarded from the surgical point of view, were all successful, although good vision was not, as might be expected, restored in every case. Thus, No. 65, a man aged 80, had such extensive myopic choroiditis, combined with senile retinal changes, that good vision, in spite of successful extraction, could not be expected. Still, even in his case, there was some material benefit.

Nineteen patients suffered from after-cataract, none, however, very severely. Ten were needled, all with good result; nine remain to be done, of whom three have that unavoidable and somewhat annoying pleating of the lens capsule into fine vertical parallel folds, which may come on at any time in so many cases of cataract extraction. Its formation must always be expected as long as the present method of leaving the lens capsule in the eye is in vogue. Other patients in the series have probably this form of after-cataract developing, but in how many it is impossible to say, as I have been unable personally to inspect every eye.

Needling as a rule restores a satisfactory and occasionally a high degree of visual acuity, and is attended by little risk, provided that the ordinary rules as regards asepsis are complied with; it is a matter of convenience when dealing with fine membranes to work by artificial light. Some years ago a curious complication occurred in my practice as a result of needling for after-cataract. An excellent opening was made in the membrane, but unfortunately a small piece of capsule attached by a pedicle gravitated to the bottom of the anterior chamber, and, by acting as a foreign body, set up repeated and painful attacks of iritis. The pain set up by these attacks was so great that the patient, a most sensible person, stated that she "almost roared" with it. The curious feature was that, as long as the pupil was kept dilated by atropine the patient was comfortable, but the moment the drug was discontinued and its effects began to pass off, the eye again became inflamed. Finally, I was compelled to make a small incision with a keratome, introduce a pair of capsule forceps and withdraw the offending particle. From that day to this the patient has had no further trouble.

I will conclude by referring briefly to the seven cases of secondary cataract included in the series. One (No. 70) suffered from subacute glaucoma, two (70 and 74) from chronic glaucoma, two from iris bombé (72 and 73), one from detached retina (75), and one (76) from excluded pupil and choroido-retinal mischief. With two exceptions (74 and 76) whose cases were desperate and who had bare perception of light, all appeared likely to be benefited by operation. Taking first the two patients with iris bombé, extraction was followed by brilliant results, excellent sight (6/12) being restored in each case. As might be expected, however, the results in the three cases of glaucoma were not nearly so good: one eye was altogether lost, the lens and vitreous being expelled the moment the corneal section was completed; in the other two cases peripheral iridectomy was first performed, followed a week or two later by extraction. Both made good recoveries, but one (74), already alluded to as an unfavourable case, has now no perception of light, the other has moderately dense after-cataract, which can be dealt with later if necessary. Fortunately for these last two patients, their other eyes have been operated upon with success and possess good vision. With regard to the case of detachment, a man aged 59, there is little to be said. The diagnosis of the condition had been made a year or two previously before the cataract was fully matured, and the hopelessness of the condition pointed out. At the patient's own request, I removed the cataract when mature, hoping that some slight benefit might result. As he was able to count fingers afterwards, something was gained by operation, but vision could not be improved by glasses,

Unfortunately for this patient, his other eye had been lost many years before from injury. Last of all comes the patient with old iritis and probable further changes. The prognosis in this case being practically hopeless, extraction was performed by the house-surgeon without mishap, but without material benefit as regards the vision of that eye. Of the whole number, therefore, of these admittedly unsatisfactory cases, two were quite successful, one may be needed if necessary at some future date with a fair prospect of success; one the patient with detached retina, can count fingers; while the remaining three are failures.

These results are not bad, and afford, I think, some argument in favour of removing an opaque lens whenever the local conditions offer some slight prospect of improvement. A list of the patients, with the tabulated results as far as can be ascertained in each case, is appended.

Primary Senile Cataract. Sixty-nine Cases.

	NUMBERS.	TOTAL.
Not traced, but had good eyes on leaving hospital...	1 — 5	5
Letters stating that result is satisfactory	6 — 20	15
6/6 vision	21 — 23	3
6/9 „	24 — 34	11
6/12 „	35 — 44	10
6/18 „	45 — 51	7
6/24 „	52 — 54	3
6/36 „	55 — 59	5
<6/36	60 — 69	10*
		—
		69
		—

*Five of these have after-cataract.

One has myopic choroiditis.

„ „ synchysis scintillans.

Two are the failures alluded to in the text.

A CASE OF SOAMIN POISONING RESULTING IN OPTIC ATROPHY.

BY

R. H. ELLIOT, M.D.Lond., F.R.C.S.Eng.,

COLONEL I.M.S.,

SUPERINTENDENT, GOVERNMENT OPHTHALMIC HOSPITAL, MADRAS, SOUTH INDIA.

History.

DR. C. G. T., European, æt. 32 years, a former pupil of mine, consulted me on January 20th, 1911, giving the following history.—Whilst operating at the end of 1908 (dates vague), he contracted finger syphilis; secondary symptoms appeared on 10th February, 1909; he was placed under active mercurial treatment for 5½ months by a commissioned medical officer of experience, but the syphilitic manifestations continued, and he was advised to have injections of Soamin. Accordingly, ten injections of the drug were made into the buttocks on alternate days, ten grains being given at each dose; the last injection was made on 21st August, 1909.

On August 28th (seven days later) he noticed he could not see properly with the right eye. His principal complaint was that he had lost the

temporal field of that eye, and could not guard himself from objects lying to or coming up on his right side. He did not think that the disease was progressing. He stated that his vision was quite good before the injections. He suffered from evening headaches during the whole course of the disease, and these continued even after the treatment by Soamin. After the course of injections, he noticed an intermittent "buzz" in the ears, synchronous with the pulse; at this time, too, he suffered from very severe sciatica of the left side and was markedly anæmic. Morphia was freely used. He was greatly troubled with photopsia referred to the right eye at the time. I give his own words. "I used to see when I shut my eyes—but only on the right side, and even when open in the dark—peculiar fern-like or palm-like figures in flame, sometimes quite pretty effects like one sees at a pyrotechnic display. These pictures used always to vary while I watched them; they were very persistent and together with the pain of my sciatica kept me awake. I don't find them trouble me now."

There is no history of alcoholism; and I believe the patient to be a temperate man. Formerly, he was a good revolver shot, making 28 points out of 32 in a competition; he also played games well, and is confident that his peripheral field was good before the date mentioned. The failure was comparatively sudden, and has disabled him from playing games, like tennis, for he is now unable to see balls coming in on his right-hand side.

He was examined in August, 1909, by a competent surgeon, who found "the margin of the disc (R. eye) very ill-defined," but was unable to note anything further at that time. Whilst out riding in 1904 he was carried under a tree by a bolting horse and received a severe blow above the right eyebrow. A severe black-eye resulted, and there was great chemosis, due to effusion of blood under the conjunctiva. A fracture of the outer table of the frontal bone was suspected. The vision was dim at the time. This was ascribed to the subconjunctival hæmorrhage.

Examination.

External appearance of eyes normal. Pupils react normally. Right vision (with own glass) is $6/9$; left vision (with own glass) is $6/6$ and $6/5$ nearly.

Ophthalmoscopic Examination.—Right eye.—Disc very pale except for a narrow margin on the inner side; a very wide and moderately deep physiological cup occupies five-sixths of the whole disc, and over this area the lamina cribrosa is seen very white and with unnatural distinctness. On the outer side of the disc is a crescentic staphyloma. Left eye.—There is a wide and moderately deep physiological cup, but the lamina cribrosa is not so obvious as it is in the other eye, and the colour of the disc is nearly uniform throughout. Although paler on the outer side than on the inner, the disc nowhere presents the unmistakably pathological pallor of the opposite side. Nevertheless, it is very slightly paler than one would expect to find in a normal eye; there is a great contrast between this eye and the other in this respect. A crescentic staphyloma is present in this eye also.

Perimetric tracings.—A former medical attendant, Dr. A. de Sousa, very kindly sent me copies of the perimetric tracings taken on February 22nd, 1910. The left eye then was much the same as at present. But the right eye gave the following measurements:—Up 35° ; down 30° ; in 35° ; out 70° .

On January 21st, 1911, I found the left eye field for white 50° up, 65° down; 60° in, and 85° out; the red field 25° up, 25° in, 30° down and 55° out; field for green 15° up, 15° in, 25° down and 35° out; while the right eye

showed extreme contraction. White field up 20° , down 15° , in 30° , out 45° ; red field up 15° , in 15° , down 12° and out 35° ; green field up 10° , in 12° , down 12° and out 20° .

Remarks.

The number of published cases of Soamin poisoning is considerably less than that of the other allied synthetic compounds of arsenic. Two cases of optic trouble following the use of this drug are, however, quoted in THE OPHTHALMOSCOPE for February, 1911 (pp. 132 to 134), and, I believe, from what medical men tell me, that there must be a large number of unpublished cases.

The difficulty in fixing the blame on the drug in these cases is obvious, but I think little, if any, doubt can exist in this case. To sum up the evidence.—(1) the patient, a medical man and a good observer, is positive that he had possessed a normal field of vision up to the time when he first noticed the defect in his right eye; (2) his record as a revolver shot and as a sportsman in games, etc., shows that he must have had a full visual field; (3) the loss of the visual field was sudden and came on within a week of stopping the Soamin. (4) From the record taken at the time, the right field even then showed distinct limitation, which has since progressed to marked retraction, whilst the left field was, and has remained, slightly circumscribed. (5) An ophthalmoscopic observation by a competent surgeon in August, 1909, revealed nothing more than a want of definition of the disc margin, and evidence of myopia in the right eye, whilst now even a student would detect the atrophic condition of the nerve without difficulty. (5) There remains to be considered the part played by the head injury which he met with nearly five years previous to the time when his eye-trouble began. I think that the sub-conjunctival hæmorrhage must have been the expression of a fracture of the orbital plate of the frontal bone; it is not easy to say whether the transient dimness of vision complained of at the time was due to the compression of the optic nerve by this hæmorrhage, or whether he was correct in ascribing it to the condition of his conjunctiva; the latter might of course easily have interfered with the nutrition and clearness of the cornea; it is evident that the nerve was not lacerated or even severely injured. Had his injury any influence in determining the greater tendency to atrophy shown by the right nerve as compared with the left? The possibility, and even the probability, of such an influence cannot be easily neglected in summing up the case, but one thing at least seems clear, *viz.*, that the factor which finally determined the atrophy of the right nerve at least was the administration of the Soamin. Of the left nerve it is harder to speak positively, although even here the presumption is not wanting.*

LENGTHENING A RECTUS TENDON IN SQUINT OPERATIONS.

BY

N. BISHOP HARMAN, M.B., F.R.C.S.,
LONDON, ENGLAND.

IN squint of long standing it is pretty certain that the condition of the muscles is altered. In convergent strabismus, for example, it is remarkable how thin may be the external rectus tendon, and how stout by comparison

* The foregoing case is reminiscent of the *Neuro-recidiv* sometimes seen in treating syphilitic patients with Salvarsan.—EDITOR.

the internal rectus tendon. It is fairly evident that the external muscle is stretched and the internal contracted. For this reason alone it would appear good practice to apportion the readjustment of the muscles between the two of them. Further, such practice will tend to remove the liability to the production of deformity by making the operated eye more or less prominent than its fellow according as tenotomy or advancement alone has been performed. Tenotomy, when practised without advancement, is without doubt falling into desuetude; its permanent drawbacks are too certain. If it be bad practice to do this operation alone, it is, I think, worse practice to combine it with advancement, for the abduction of the globe by the shortening of the external tendon ensures the maximum separation of the cut internal tendon. In any case one has the dissatisfaction of not knowing what part of the operative measure secured the result attained. Tendon lengthening has been tried by many but, so far as I can find, it does not seem to be very popular, and the reason may be that effective methods of securing this result are too complex for everyday work, and quicker methods are ineffective.

The delicate methods of Stephenson, Landolt, and Grimsdale require much patience, and then the result depends upon a frail suture. Verhoeff's partial plastic tenotomy is extraordinarily neat on paper, but it is difficult to perform on the living subject, and I am not convinced that any real slackening of the tendon is secured. After adopting these methods, I tried a variety of tendon cuts by making the experiments on strips of inelastic strapping. Therefrom I evolved a method of three cuts which gave me all I wanted. It was so simple that it seemed that someone must have done it already, and in Casey A. Wood's new textbook of eye operations I find very nearly the same method figured; but, if the author of that operation—Dr. Todd—will forgive me the criticism, it seems that he has just stopped short of doing what he set out to do.

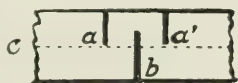


Fig. 1.



Fig. 2.

1. Shows *a a'* cuts on one side tendon to middle line *c*; *b* intermediate cut extending to two-thirds width of tendon.

2. Tissue stretched after cuts are made showing band uniting axis of tendon.
(*Drawn from effects obtained by cutting strapping.*)

The operation which I am now performing in suitable cases for the purpose of lengthening a rectus tendon, either alone or in conjunction with the shortening of the opposite rectus, may be described as follows.—The steps of the operation and the effect can be seen very well if it be practised upon a piece of narrow adhesive strapping, stretched between two fingers of an assistant. The tendon to be lengthened is exposed a short distance from the insertion. Supposing it be an internal rectus, a small vertical button hole is cut parallel to the plica semilunaris and close to its edge. Tenon's capsule is cut and pushed back similarly. A squint hook is passed beneath the tendon and slowly lifted, so as to draw the tendon into view. Then two cuts are made in the same edge of the tendon one on either side of the hook as far apart as possible, so as to divide the tendon at each cut *up to the middle line of the tendon*. Then the hook is pushed slightly to one side so that a cut may be made from the opposite edge of the tendon between the two cuts already made and this cut is made from the edge right across the middle line of the tendon so as to sever *two-thirds*

of its width Immediately this third cut passes beyond the middle line the tendon will be felt to give, and it will yield distinctly as the cut is continued.

Todd's operation, as described by Wood, consisted of two or three cuts from opposite edges of the tendon. "He divided one-half the fibres from one edge, a short distance from the insertion, and divided the other half of the fibres from the other edge of the tendon a little farther back from the insertion" (p. 701, with figures). If these two methods be tried on the same piece of strapping, as suggested above, it will be found that when Todd's cuts are correctly performed, the strapping does not yield at all; but when the intermediate cut is made as I suggest to two-thirds the width of the tendon, the strapping will be found to stretch widely.

It may be thought that cutting the tendon in this fashion would throw the origin and insertion out of alignment and so produce a vertical squint. In the six cases I have done this method I have not found this to occur, and the reason for this will be seen when the cuts are made on the strapping. The arch of tissue over the third cut (Fig. 2 b) is seen to stretch out into a narrow strip the extremities of which unite the severed tendon at the points where the two cuts, *a* and *a'*, touch the middle line of the tendon; this narrow band pulls straight out along the axis of the tendon. When operating upon the living subject one can feel this band and see it, and it would seem that it forms a much more secure link between the separated portions of the tendon than could be provided by a silk or other suture. The extent of the separation can be slightly regulated by the extent of cut *b*, every fraction of increase in the section over the middle line increases the effect, but I have never ventured to make the cut deeper than what appeared to be three-fourths the breadth of the tendon. Finally, the wound in the conjunctiva is closed with a suture from above downwards.

CLINICAL MEMORANDA.

HYALINE NODULES IN THE OPTIC DISC IN A CASE OF RETINITIS PIGMENTOSA.

BY

ERNEST THOMSON, M.D.,

SURGEON TO THE GLASGOW EYE INFIRMARY

ON August 14th, 1912, I was consulted by a gentleman, aged 28 years, on account of failing vision and night-blindness. The case was obviously one of pigmentary degeneration of the retina with restriction of the field to the 20 degree circle. There was posterior cortical cataract, so that although the outstanding features of the fundi were easily distinguishable, finer details were difficult to estimate. It was nevertheless plain enough that some peculiar changes, such as I had never to my recollection observed before, existed about the edges of the discs. In the note made at the time I referred to them as probably "*Drusen*" but on looking up Collins and Mayou's *Pathology and Bacteriology* (pp. 482 and 491), after the departure of the patient, I found that hyaline bodies about the disc, probably formed, the authors say, as a deposition from the blood vessels and differing from "*Drusen*"

of Bruch's membrane at the disc margin, have been found several times associated with retinitis pigmentosa. These hyaline bodies sometimes protrude forwards from the centre of the disc, but may proceed from its margin. Since, from what they say, the association seems to be uncommon, it is well that the facts should be recorded.

In the right eye there are four approximately rounded and seemingly translucent or semi-translucent masses, situated two over the upper and two over the lower disc edge, on either side of and appearing partly to embrace the emergent retinal vessels. In the left eye there is one large patch, approximately three-fourths the disc diameter, on the upper disc edge, and one on either side of, and perhaps meeting across, the retinal vessels below. These patches or nodules are somewhat grey in colour. I found it impossible to determine their exact height, but only here and there are the vessels actually obscured. The upper patch in the left eye bears a superficial resemblance to opaque nerve fibres, but is neither white and solid enough, nor sufficiently fringed at its upper margin, to be of that nature. A glistening reflex can be detected from somewhere within the boundaries of the patches. This might presumably be due to the calcareous granules referred to by Collins and Mayou (*loco citato*, p. 491) as sometimes occurring in these hyaline bodies.

My object, however, in publishing this note is rather to refer to the association between hyaline bodies and retinal pigmentary degeneration than to attempt an ophthalmoscopic description of the former.

A CASE OF RECURRENT HÆMORRHAGES INTO VITREOUS IN A YOUNG PATIENT (WITH RETINITIS PROLIFERANS), CURED BY ADMINISTRATION OF THYROID EXTRACT.

BY

H. PERCY BENNETT, M.B., C.M.,

SURGEON TO THE EYE INFIRMARY, NEWCASTLE-ON-TYNE.

THE patient, a woman of 23 years, a milliner's assistant, was first seen by me in December, 1910, when she came to the Newcastle Eye Infirmary, complaining that she could not see to do her work. She was well developed, but pale and a trifle anæmic. There was no history of tubercle, and there was nothing suggestive of congenital syphilis. She had not suffered from epistaxis: there was no marked constipation.

Vision in the right eye was 6/24, and in the left barely 6/60, but the patient had to turn her head in a particular direction to see as much as this with her left eye. Sight in the left eye had been defective for about two years, and in the right for a few months. Retinitis proliferans was present in her left eye; and there was an incipient stage of the same condition in the other one (rudimentary blood-vessels could be seen coming forward into the vitreous). On the first examination of the right eye, it was possible to see a circular area of two or three disc-diameters, situated near the outer side of the disc, and at a slightly higher level, where there were many small round retinal hæmorrhages.

She was at once admitted as an in-patient, and given 15 grs. calcium lactate, t.i.d., inunctions of mercury daily, and pot. iod. internally. Later on she was given a course of iron and tonics. Subcutaneous injections of fibrolysin, and instillations of strong dionine were tried. In spite of all treatment, her sight got so bad that she could scarcely see to find her way about. Arrangements were then actually completed, and funds raised, for

her going to an Institution for the Blind, where she could learn type-writing. X-rays were applied to the worse eye on the suggestion of my colleague, Mr. A. S. Percival, as all other treatment seemed useless, but with no result.

On July 14th, 1911, I prescribed 1 gr. thyroid extract, t.i.d., in addition to the calcium lactate. In about three weeks' time the patient began to notice that her sight was better. This gradually improved until, on February 23rd, 1912, when I last saw her, V.R. was 6/6 partly, and V.L. was 6/18. There were then some slight membranous opacities in the right vitreous, and some glistening streaks in the area of the retina alluded to. The left eye showed dense membranes chiefly in the upper part of vitreous, with vessels running in the membranes and apparently springing from near the disc. The patient has now been for several months at her former occupation, and has promised to see me at once should her sight get worse. For four months she took 1 gr. of the thyroid extract thrice daily, and for a further two months 1 gr. once daily.

I have no doubt whatever that the thyroid extract (or thyroid *plus* calcium lactate) was the cause of the improvement. I admit that my prescribing it was in desperation and in the nature of a final plunge! Parsons, in his *Pathology of the Eye*, says that he thinks there is some toxic condition which leads to these retinal hæmorrhages, and that the mesoblastic tissue at the papilla is (if near the hæmorrhage) excited to reparative reaction (proliferation and organization). This toxic condition must have been improved by the administration of the thyroid extract, which, Hale White says, leads to a greatly increased oxidation of all the tissues, and consequently an excess of urea, uric acid, xanthin bases, and phosphates is excreted in the urine, and more carbonic acid by the lungs.

I regret very much that an examination of the blood was not made: a report as to coagulation-time, blood-cell count, or as to any bacterial condition would have been very useful as a future guide.

I am aware that thyroid gland has been used in the treatment of various forms of intra-ocular hæmorrhage, but up to now I fear I have not given it its due measure of praise, and this case is therefore recorded, as I suspect there may be many eye-surgeons who have not given it a fair trial.

The patient still takes small doses of thyroid at intervals.

EPILEPTIC FITS INDUCED BY THE USE OF ESERIN SULPHATE.

BY

T. MILNES BRIDE, M.D.,

HONORARY ASSISTANT SURGEON, MANCHESTER ROYAL EYE HOSPITAL.

Case.

E. A., female, æt. 46 years, was admitted as an in-patient at the Royal Eye Hospital, Manchester, on March 3rd, 1911, suffering from chronic glaucoma. Her previous health had been good, as was her family history. One sister was an epileptic, but patient had never had any fits. The treatment prescribed was the instillation of guttæ eserini sulph. (gr. 4 ad 3i), six times daily into either eye. Under this *régime* the pupils became well contracted, and no untoward symptoms were noted until March 9th, when patient complained of pain in the occipital region, which passed away, and did not recur until March 10th.

On March 11th patient had an epileptic fit at 3.30 p.m., followed by a second at 7 p.m.; both fits were preceded by vomiting and violent pains in the head. Calomel, grs. 3, was administered.

Her condition at midnight on March 11th was as follows.—She complained of intense occipital pain; pulse 60, slow, and forcible; no abdominal pain; the knee-jerks were exaggerated, but ankle-clonus was not elicited, and the plantar reflexes were normal. Since 9 p.m. she had had two fits and vomited four times. The eserine drops were now stopped, and potassium bromide, grs. 20, and chloral syrup, grs. 30, were administered every four hours.

From this time the patient's condition became steadily worse, she had frequent fits and salivated a good deal, a frothy mucus discharge running from the mouth, she gradually became unconscious and at 5 a.m. on March 12th was comatose and stertorous, the corneal reflexes were absent, pupils were fairly contracted, pulse was 60 and of full tension, colour of face and lips was good.

After 5.30 a.m. the fits and vomiting ceased and the general condition began to improve. The notes taken on March 12th state "patient much better, pulse 124, tongue moist and furred, temperature 99.8° F., sleeps continuously, no headache."

On March 14th she was transferred to the Manchester Royal Infirmary, and there made an uneventful recovery.

On March 23rd, 1911, patient was again admitted to the Royal Eye Hospital. Eserine drops were inadvertently prescribed for the eyes and one drop of a solution containing grs. 4 ad. $\frac{3}{4}$ i. was instilled into either eye at 8 p.m. Twelve hours later she had two epileptic seizures with intense headache and frequent vomiting. No more drops were used and the next day patient was well except for some slight headache. On March 28th, 1911, drops of pilocarpine nitrate (grs. 4 ad. $\frac{3}{4}$ i.) were used to the eyes but without any constitutional disturbance.

The patient was seen by me on May 9th, 1912. She has had excellent health since she was in the Hospital and has had no recurrence of fits, which, I may say, she attributes to the eserine drops.*

Remarks.

This appears to me to be a case in which epileptic fits were induced by the absorption of eserine. There was a family history of epilepsy, but the patient had never been affected previously. Hale White states that eserine increases the number, frequency, and intensity of the fits in epileptics, and this has been demonstrated on guinea-pigs rendered epileptic by operation. In dogs the injection of eserine is occasionally followed by epileptiform attacks. It will be noted that eserine was used for six days, after the patient's first admission to hospital, before any symptoms of poisoning appeared, and that almost immediately it was discontinued, the fits ceased. On the second occasion a very small amount of the drug caused symptoms of poisoning, which immediately disappeared when instillations were abandoned.

Some German authorities give the maximum dose of eserine as 3 drops of a 0.5% solution instilled 3 times daily, but at the Manchester Royal Eye Hospital a 1% solution is often used 8—12 times daily without any bad effect, although, in cases of chronic glaucoma, it will sometimes produce headache and vomiting.

* I am indebted to Dr. J. Gray Clegg for permission to publish this case.

FOREIGN BODY, THREE INCHES LONG, REMOVED FROM THE ORBIT OF A SMALL BOY: WOUND OF OPTIC NERVE.

BY

EDGAR STEVENSON, M.D.,SURGEON TO THE EYE AND EAR INFIRMARY,
LIVERPOOL, ENGLAND.

B. W., aged ten years, was brought to my out-patient Clinic on August 3rd, 1911. He was semi-conscious, and had to be carried.

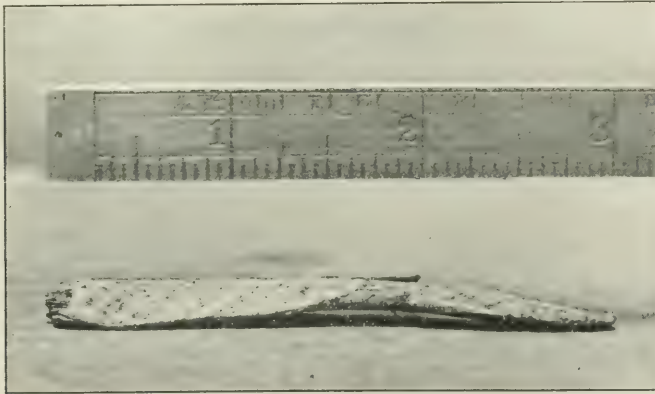
He had a clean-cut wound, one-third of an inch long, in the skin of the lower lid at the inner and lower margin of the right orbit, just below the inner canthus. This wound had been caused about an hour previously, by his having fallen, while playing with some other boys, on to a home-made arrow that he was carrying. The parents thought that there was no piece of the arrow remaining in the wound.

The boy was in a very drowsy state; temperature 105° F.; frequent attempts to vomit. The eye presented the appearance of total ophthalmoplegia with slight proptosis, but without loss of sensation.

With the ophthalmoscope, I found slight optic neuritis, and, as far as I could ascertain, he had no perception of light in that eye. The wound was probed, and a rough surface felt on the inner side. This was considered to be bare bone, due to ploughing up of the periosteum by the arrow, which, by the way, had been left in the field where the accident happened.

As the boy was apparently moribund, he was put to bed. The wound was gently syringed, and a gauze drain inserted.

To cut a long story short, his condition began to improve, in twenty-four hours consciousness returned, and temperature gradually fell to normal, but the ophthalmoplegia persisted, and the optic nerve, when examined two days later, was completely atrophic.



In ten days' time, he was sufficiently recovered to go about. The wound, however, persisted as a small sinus, discharging a little pus, so about a month after the accident, I opened it up, and felt what seemed to be a slightly movable piece of bare bone, just inside the orbital margin. With considerable difficulty, I managed to grasp it with a pair of bone-forceps, and, very much to my surprise, gradually withdrew a tapered piece of wood exactly three inches long. The wound then healed without further difficulty.

The piece of wood was roughly a flat triangle, in section three inches wide at the proximal end, and tapering to a rather blunt point, the broadest flat side of the triangle lying against the nasal side of the orbit.

The boy himself had no feelings of discomfort before the wood was removed, but when he had recovered from the anæsthetic, he said he felt as if something were missing from the side of his nose. I have seen the boy lately. He is in perfectly good health, but there is no change in the condition of his eye. His other eye is normal.

Remarks.

The anatomical relations of this foreign body are interesting. It was wholly inside the margin of the orbit, which in a boy of that age is about $1\frac{2}{3}$ inches deep. Therefore the point of the "arrow" must have projected $1\frac{1}{2}$ inches beyond the sphenoidal fissure.

It had effectually destroyed all the motor nerves, the optic nerve, and, I think, some of the sympathetic branches, as the eye is now rather sunken, and it must just have missed the internal carotid artery and the Gasserian ganglion. The ophthalmic nerve seems to have escaped. Its point would lie beyond the apex of the petrous bone, and from the boy's early symptoms, I have no doubt that it had penetrated the dura mater.

Foreign bodies of this size are not often reported in connection with the orbit. In fact, except for the famous case of the three inch piece of iron hat peg reported by Mr. George Lawson, which apparently entered the antrum, I do not remember having heard of a similar case. I must admit, however, that I have not made an extensive search in recent ophthalmic records.

NOVELTIES.

DIRECTOR-FORCEPS FOR USE IN PARTIAL TENOTOMY.

BY

N. BISHOP HARMAN, M.B., F.R.C.S.,

LONDON, ENGLAND.

The forceps shown in the illustration were devised to help in the operation of tendon lengthening described on page 16. When two or three partial sections of a tendon are to be made, the bleeding from the first cut not infrequently disturbs the exactness of the second cut. These forceps hold the tendon, check the bleeding, and at the same time provide a guide or director which materially helps in making the cuts. The ends of the forceps



are bent on the flat at an angle of 30° . The lower blade has a longitudinal groove on the inner surface, the upper blade is cut through in a longitudinal slot which corresponds with the groove in the lower blade. The upper surface of the upper blade has a transverse mark at the middle point.

In operating with this instrument, the tendon is exposed, brought up on a squint hook, and the edges cleaned for 2 or 3 mm. next the insertion. Then the

lower blade of the forceps is slipped under the tendon as the squint hook is withdrawn. The forceps are closed and note is taken that the transverse mark on the upper blade lies over the axis of the tendon. In operating to lengthen a tendon with this instrument, it is better to make the middle two-thirds cut first, by running a pointed knife along the groove formed by the forceps; then the two half-way cuts are made one on each side the forceps with scissors. I have operated upon five cases with these forceps and find them serviceable.

Note may be made of the finger grips on the the forceps. Holes give a much more certain grip than grooves, fluting, or filing; they lighten the instrument, and are obviously clean. The holes must be cut square-edged and not bevelled.

The forceps are made by Messrs. Weiss, of London, W.

TRANSLATION.

STUDIES ON THE FIELDS OF VISION WITH REFERENCE TO THE RELATIONSHIP BETWEEN PERIPHERAL VISUAL ACUITY AND COLOUR SENSE, AND ESPECIALLY REGARD- ING THEIR INFLUENCE UPON THE PROGNOSIS OF ATROPHY OF THE OPTIC NERVE.*

BY

DR. HENNING RÖNNE,

FIRST ASSISTANT IN PROFESSOR BJERRUM'S CLINIC AT COPENHAGEN.

THE paper commences with a general consideration of the value of examination of the fields of vision. False conclusions drawn from these examinations generally depend upon the fact that the investigator has no clear idea of what function is measured in the retinal perimetry, and is ignorant of the sources of error. It is well known that examination of the fields gives no exact measurement of the extent of retinal perception. For example, if we take advantage of dark adaptation and examine with a strong light we find that perception extends to 90° on the nasal side; that is to say a full 30° beyond the limits of ordinary perimetry. The limit of the visual field is not an absolute one, but only relative, depending upon the intensity of the illumination and the visual angle of the objects. These facts not only expose the sources of error, but suggest a more exhaustive specialisation in the examination by graduating these various attributes of the object exhibited to the patient examined. Such a quantitative measure can be achieved by altering the size of the object, as Bjerrum has suggested, or by altering the intensity of the light by smoked glasses (Ole Bull). Naturally, it is not immaterial which method one selects, for if we vary the light intensity, we investigate the light-sense; if we alter the size, we measure visual acuity.

It has been found that as we diminish the size of the object, the field narrows and the boundary lines are concentric. These lines can be called *isopters*, bearing in mind that Hirschberg has applied the term in another

* Abridged translation from *Klinische Monatsblätter für Augenheilkunde*, Februar, 1911.

sense, namely, to describe stations in the field with equal distinguishing angles. The outer boundary of any field of vision is therefore an isopter which is a function of the size of the object.

The isopters lie very close together towards the periphery, so that the boundary of the field of vision is apparently independent of the size of the object. This fact, however, only signifies that the "point visual acuity" falls suddenly near the outer boundary of the field, but it is by no means a universal rule that the outer boundary of the field, taken with large objects, is independent of the size. On the contrary, as soon as under pathological conditions the point visual acuity falls, then the isopters for objects with large visual angles have a corresponding amplitude. This dependence of the outer limit of the field upon the visual angle shows in the best manner that perimetry is of the nature of a determination of the "point visual acuity" (*Punktsehschärfebestimmung*).

If we draw upon the perimetric chart the boundaries of a series of determinations of objects of different visual angles, we get a series of similar curves, the isopters. The course of these isopters gives a graphic demonstration of the functional activity of the retina.

We see therefore that perimetry examines a function not far removed from visual acuity. Many may object that perimetry should be regarded as a measure of light-sense. Here, we may remark, that light-sense and acuity cannot be absolutely separated, for both are attributes of the same anatomical elements, and both are conducted over the same nervous paths. Therefore, perimetry contains an element of light-sense determination, but it is wrong to confine it to this, and not only incorrect, but impractical. It is neither a determination of the liminal value of excitation, which would exclude dark adaptation, nor of the liminal value of perception of difference of excitation. All these difficulties can be avoided if we regard perimetry as an investigation of the "point visual acuity." This is explained by the fact that function from the fixation point outwards does not fall off equally, but manifests first of all a regular but slow diminution, which becomes rapid towards the periphery. This is however only apparent for the limit of perception of objects of from 10 mm. to 20 mm. square. These are practically identical in the normal field, but in the pathological field they may differ by 40° —that is to say, the boundaries of the pathological field are more mobile.

Examination of the field with a single object is very incomplete. The complete chart must contain a series of isopters. The character of this chart gives considerable information as to the nature of a pathological process. The asymmetry found in hemianopic charts often depends upon a hemiamblyopia. The same fact explains the circumstance that the macula is so constantly spared, it is the least amblyopic part of the hemianopic amblyopic field.

In diseases which show defects in the fields caused by lesion of complete bundles of nerve fibres, the situation of the defect will depend upon the course of the nerve fibres. The effect upon the isopters will be different when the fibres run across the isopters from that seen when they run more or less parallel.

There is a distinct type of ring scotoma which depends upon a general central depression of function caused by choroiditis. In consequence, the paracentral area has a more diminished function than the peripheral area. The central area, naturally, is much more fully endowed with perception faculty, and, in consequence, a ring scotoma appears.

Investigation of the fields for colour cannot take the place of the examination with objects of various size and the study of a series of isopters.

Both are equally indispensable. In some cases the results obtained by both methods correspond; in others they differ widely. There may, in other words, be *proportion* or *disproportion* between peripheral visual acuity and peripheral colour vision. This may be exceedingly surprising, for both functions are carried by the same nerve fibres, and should stand and fall together. We must assume that when a certain number of fibres are destroyed, and the remaining ones are not injured, the proportionality between acuity and colour perception will remain undisturbed. This will be especially the case in stationary and completed diseases of the visual elements. When there is disproportion, there is an inhibition of conduction, which may easily affect one function more than the other. This occurs in early affections, which attack many nerve fibres and injure them without complete destruction. We can in this way distinguish between a florid and an obsolescent affection.

In testing the colour fields, objects of varying size must be used just as in the case of white, for not infrequently pathological defects are unmasked by the use of a small coloured object which are overlooked when a larger one is chosen.

The communication then passes on to consider the conditions met with in various pathological states of the optic nerve and retina, and charts of the fields found are included in the text.

Stationary optic atrophy.—All these cases have almost certainly suffered from optic neuritis. In all the fields it is obvious that the colour sense is markedly affected; but it will be noticed that peripheral visual acuity is diminished in a proportional manner. In no example in the category did any colour entirely fail to be perceived, there was in every case “proportionality.”

Progressive atrophy of the optic nerve.—Uhthoff divides progressive spinal optic atrophy into two groups.—(1) Diffuse atrophy in which peripheral colour vision is defective in greater or less degree. (2) Partial atrophy in which defects in the field are sharply contrasted against the adjacent normal portions, a condition characterised by the fact that the colour boundaries everywhere coincide with the outer margin of the field close to the defect. Wilbrand and Sanger, while approving of Uhthoff’s classification, add to it a third group of syphilitic tabetic atrophy, a retrobulbar perineuritis, whose prognosis is relatively good. Ronne has not met with this third group. After shortly recounting the histories of cases of this kind whose fields are presented in the text, the author points out that some of these cases show “proportionality” others “disproportionality.” This fact is apparently inconsistent with the views expressed above, for we are now dealing with progressive florid disease.

The paradox, however, is only apparent. It is not necessary that the disproportionality *must* appear, because until the number of destroyed fibres is proportionally large in comparison with those that still perform their function, the loss of function is not very evident. Proportionality suggests a relatively early condition; disproportionality a late stage when many conducting elements have perished. Examination along the lines indicated shows that **tabes** is a disease of conducting fibres, not a disease of the perceptive system. In many tabetic fields the nasal step (“*nasal Sprung*”) is obvious, a straight line forming the boundary of the field of vision corresponding to the raphe, which the optic nerve fibres form in the temporal portion of the retina. This type of field, showing a nasal step, can only be due to a nerve fibre vision. It should be noted that the nasal step seen in these cases is never so well marked as the typical glaucomatous sectorial defect. Study of the tabetic fields given in the text shows that it is a mere chance in which portion the disease begins. Sometimes it is the nasal half, at others the temporal. The arcuate paracentral fibres may suffer first or the papillo-

macular bundle may first show signs of failure. But in all cases the fibres fail by bundles, causing scotomata and the nasal step.

While corroborating Schoen and Uhthoff in their classification, Rönne shows that it is incomplete; no sharp distinction can be made; all kinds of transitional forms are met with.

The two types of field (proportional and disproportional) express two developments of optic nerve atrophy. In one, the degeneration attacks the nerve simultaneously in a whole cross-section; in the other, the process starts from a focus and spreads from fibre to fibre, giving a field of vision in which defects representing complete bundles of fibres are well marked.

The so-called "sectorial" defects are really nerve bundle defects; the same is true for the nasal step. Wilbrand and Sängner suggest that these two types of field may have a value with respect to prognosis. Rönne does not anticipate this. There are so many exceptions that the practical value is slight; but, on the whole, we can say that disproportionality speaks for a florid lesion, with a bad prognosis, proportionality for an obsolescent or slowly developing lesion, with a better prognosis.

Other diseases of the conducting system.—In *glaucoma* there is always proportionality between peripheral visual acuity and colour sense. In some cases perception of colour was markedly diminished, but the diminution was always accompanied by a contraction of the field for small white objects.

In optic neuritis proportionality was well maintained, but the cases examined were benign and stationary.

T. HARRISON BUTLER.

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—EYE MOVEMENTS OF LABYRINTHINE ORIGIN.

Bartels, Martin.—Eye movements of labyrinthine origin. (Ueber die vom Ohrapparat ausgelösten Augenbewegungen.) *Klin. Monatsbl. f. Augenheilkunde*, August, 1912.

Bartels' long and able paper contains a good deal that is of only indirect interest to the ophthalmologist, but an attempt may be made to summarise the more important parts.

Labyrinthine Tonus.—Normally, the labyrinths exercise a certain constant influence on all the eye muscles, and the labyrinth eye movements result from increase or decrease in this normal tonus. In the state of rest the two labyrinths are exercising equal but antagonistic influences. Each labyrinth tends to cause movement of both eyes towards the opposite side, and, especially in animals with laterally placed eyes, each labyrinth tends to cause elevation of the homo-lateral and depression of the contra-lateral eye.

Physiology of labyrinthine eye movements.—Physiologically, the vestibular apparatus is stimulated by movements of the endolymph which result from movements of the head. Movements of the endolymph in a given semicircular canal call forth eye movements in the plane of the affected canal, and the eyes move in the same direction as the lymph. This law has been most fully worked out for the case of the horizontal canals. If the head is rotated to the

right, there will be, owing to inertia, a relative movement of the endolymph of the horizontal canals towards the left. In the left horizontal canal the movement of lymph will be from the ampulla into the canal, but in the right it will be from the canal into the ampulla, and, this being a more efficient stimulus, a movement of both eyes towards the left side is brought about.

Nystagmus.—Two forms of nystagmus are described, *viz.*, “pendulum nystagmus” (also called true nystagmus), and “jerking nystagmus” (also called nystagmoid). The first consists of equally rapid to and fro movements of the eyes. In the second, a relatively slow movement in one direction is followed by a more rapid movement in the opposite direction. Thus, it always presents a slow and a rapid phase, but, when the movements are frequent, it may be impossible to distinguish these except with the aid of graphic methods. Aural nystagmus is always of the second kind, but jerking nystagmus is not always of labyrinthine origin.

Nomenclature in aural nystagmus.—The terms horizontal, vertical, rotatory, diagonal, spontaneous, fixation, etc., have the usual significance. According to the kind of stimuli employed to elicit it, we may speak of aural nystagmus under four heads, *viz.*, I. Rotation nystagmus, excited by rotation of the head, (a) Primary, which occurs during the rotation, and (b) Secondary (or after-nystagmus), which occurs when the rotation suddenly ceases; II. Thermal nystagmus, caused by raising or lowering the temperature of the labyrinth on one side (a) following the application of cold; (b) following the application of heat; III. Compression nystagmus (a) resulting from raising the air pressure on one side (b) resulting from reduction of air pressure on one side; IV. Galvanic nystagmus, resulting from the passage of a galvanic current through the labyrinth, usually by applying one electrode to the mastoid process and the other to some convenient part of the body (a) anodal (b) kathodal.

Explanation of the nystagmus.—It has already been mentioned that in labyrinthine nystagmus we have to deal with a slow and a quick phase. Although it is usual to indicate the direction of the nystagmus by the direction of the rapid phase, Bartels emphasizes the fact that the slow phase is the primary movement and the more important of the two. If one watches the eyes of a patient during rotation of the body, it will be observed that the first event is a slow movement of the eyes in the direction opposite to that of the rotation. This is the slow phase, and it is followed by a quick, jerky movement in the direction of rotation. The slow phase is the direct labyrinthine effect, and under certain circumstances it alone may be present. This fact has an obvious bearing on the interpretation of the results of experiments.

After-nystagmus.—In applying the tests for aural nystagmus by rotation of the patient, it is not convenient to observe the nystagmus which occurs during rotation. Attention is directed to the secondary nystagmus, which begins when rotation has ceased. This is the reverse of the primary nystagmus. For example, during rotation towards the right, there is right nystagmus, but if rotation is suddenly stopped, left nystagmus occurs. This is, of course, explained in the same way as the primary form, namely, by the relative movement of the endolymph in the horizontal semi-circular canals, but in this case the inertia of the endolymph causes it to continue in motion after movement of the head has ceased, the preponderating stimulus is from the left labyrinth, hence the eyes move toward the right (slow phase), and jerky movements towards the left follow.

Practical application of tests for labyrinthine eye movements.—For rotation nystagmus a rotating stool is usually employed. The patient is rotated from

five to ten times, the period of each rotation being two seconds. The movement is suddenly stopped, and the duration, frequency, amplitude, and direction of the resulting movements noted. In testing the horizontal canals, it is advisable to have the patient's head inclined forwards 30°. The author puts on the patient a pair of +20 D. goggles, which serve the double purpose of excluding the possibility of fixation on the part of the patient and of magnifying the movements under observation.

When an isolated test of one labyrinth is to be made, the thermal stimulus is employed. If cold water is instilled into one ear, nystagmus to the opposite side occurs; if warm water is used, nystagmus is to the same side. In cases where the quick phase is absent, cold water brings about movement of the eyes to the same side, and warm water causes the eyes to move away from the side tested. A generally acceptable explanation of this phenomenon is still to be found.

Indications.—The thermal test may be of assistance to ophthalmologists in tumours of the cerebello-pontine angle affecting one vestibular nerve, in paralysis of conjugate movements of the eyes, in testing the functions of the eye muscles in unconscious persons. In these cases it is the slow phase that is to be looked for. When an ocular muscle (or the motor nerve or nucleus) is paralysed, nystagmus cannot be elicited in the direction of action of the paralysed muscle. The tests can therefore be employed to detect paralysis of eye muscles in infants or in unconscious patients. In the latter it also aids in ascertaining the central nature of a paralysis. Labyrinthine tests have also been used in the investigation of conjugate paralysees of eye movements. In conjugate paralysis due to a pontine lesion, nystagmus towards the affected side cannot be elicited, but the slow phase persists. When the lesion is elsewhere in the central nervous system nystagmus can be produced. The spontaneous nystagmus found in cerebellar cases is due to damage to the nucleus and fibres of the vestibular nerve in the medulla. A pure cerebellar lesion does not cause spontaneous nystagmus, but it causes increase of nystagmus towards the affected side, and weakening of nystagmus towards the sound side. Every persistent spontaneous nystagmus is of central origin; nystagmus of labyrinthine origin gradually passes off.

In the last section of his paper the author discusses the nerve paths concerned in labyrinthine eye movements.

A. J. BALLANTYNE.

II.—KERATOMALACIA.

Kapuscinski, W.—The prognosis of keratomalacia. (*Die Prognose der Keratomalacie.*) von Graefe's *Archiv für Ophthalmologie*, Bd. LXXXII, Heft ii, 25 Juni, 1912.

It is generally assumed that the appearance of xerotic spots on the ocular conjunctiva, together with ulceration of the cornea (keratomalacia), if occurring in wasted children, implies a fatal ending.

Kapuscinski, of Halle a/S., refers to the statistics of the Halle Clinic to refute this statement, which has been incorporated in most text-books. Out of 31 children, 14 only died. 22 were in their first year (17 first half, 5 second half), and 12 of them (11 and 1 respectively) died. Twelve children were badly nourished, 9 of whom succumbed to infectious diseases, mostly broncho-pneumonia. There is no direct connection between seriousness of the affection and the degree of mal-nutrition, but the sooner general and local

treatment was applied the better were the chances. Out of 24 eyes examined one year after the process had subsided, 15 were blind, with more or less marked phthisis bulbi. Syphilis could be proved in only 5 out of 31 cases, and these cases were in no way different from the rest. Generally speaking, keratomalacia is a rare symptom of infantile atrophy, although comparatively common at Halle. The author attaches great importance to suitable therapeutic nutrition. Locally, an organic silver preparation (syrgol) was used, but without any marked benefit.

R. GRUBER.

III—MYASTHENIA GRAVIS.

Starr, M. Allen.—Myasthenia gravis. *Journal of Nervous and Mental Disease*, November, 1912.

M. Allen Starr, of New York, has brought together about 250 cases of myasthenia gravis, and has analysed them with reference to symptoms, pathology, treatment, and so forth. In abstract, the main features brought out are as follows.

Sex.—Of the 250 cases, 142 were in females and 108 in males.

Age of onset.—The idea that myasthenia gravis is a disease of young adult life alone is disposed of by Starr's figures, which show that, while no age is exempt, the incidence of greatest frequency lies between 20 and 30 years. The exact figures are appended:—

Age.											No. of Cases.
1-10	...	...	...	...	...	...	...	...	...	...	5
10-20	...	...	...	...	...	...	...	...	...	...	34
20-30	...	...	...	...	...	...	...	...	...	...	85
30-40	...	...	...	...	...	...	...	...	...	...	58
40-50	...	...	...	...	...	...	...	...	...	...	40
50-60	...	...	...	...	...	...	...	...	...	...	12
60-70	...	...	...	...	...	...	...	...	...	...	6
70-80	...	...	...	...	...	...	...	...	...	...	1

Symptoms.—In the majority of cases the cranial nerves are the first to be affected. For example, in 40 per cent. of the cases, ptosis or diplopia was the primary symptom. Difficulty in speech was the first sign in 16·5 per cent. of the patients. In 8·5 per cent. difficulty in swallowing was the first thing observed. In 4 per cent. of the cases the initial symptom was a weakness of the orbicularis oris, giving rise to what Gowers described as a "nasal smile" or "snarl." In 3 per cent. of the cases, paralysis of the vocal cords was the primary manifestation of the disease. In sum, then, some affection of the cranial nerves was the first sign in 69 per cent. of the cases analysed by Starr. Hence, doubtless, the tendency to confuse myasthenia gravis with true bulbar palsy. Distinguishing points between the two affections are the frequent presence in myasthenia of (a) nystagmus, and (b) diplopia, ptosis, or inability to close the eye. It must not be forgotten, however, that in 31 per cent. of the cases of myasthenia gravis, weakness was first experienced in the arms, or more commonly in the legs, and that some time passed before any of the cranial nerves were involved. This weakness has not infrequently led to the diagnosis of neurasthenia or hysteria. Headache is an early and constant sign of myasthenia gravis. It is generalised and increased by mental effort or by physical exertion, and may be due to the poison which produces the underlying disease. It has been recently shown that the sense of sight can be exhausted by looking for long

at a light or by constant reading. After such effort, the visual field, both for white and for colours, is markedly contracted, and the visual acuity is diminished.

Pathology.—Although the pathology of the disease is still obscure, it seems proved that enlargement of the thymus gland (present in some 28 per cent of the cases examined) is not an essential factor. So-called “lymphorrhages”—that is, an infiltration by small cells derived from the lymphatic system—of the muscles and internal organs of the body have been observed in almost all recent autopsies upon those who have succumbed to myasthenia gravis. But no explanation has yet been offered of their nature or of the reason for the exudation.

Diagnosis.—Diagnosis is made from the following points:—(1) rapid development of ptosis and diplopia, difficulty in speech and in swallowing, and weakness of the muscles of the face. (2) Rapid development of extreme weakness in the muscles of the limbs, and in many cases, of the head and neck also. (3) Rapid fatigue experienced in all muscles on any exertion. (4) Electrical myasthenic reaction of the muscles. (5) Variation in the intensity of the muscular weakness, and its prompt improvement under rest. Negative points of importance are the absence of fibrillary tremors, muscular atrophy, sensory symptoms, and of the reaction of degeneration.

Course.—That the disease is an extremely serious one is shown by the large percentage of fatal terminations within one year of the onset. Statistics are by no means easy to come at, since most cases are reported while the patients are still living, and the final result is unknown. In 45 per cent. of the cases collected by Starr, death is known to have occurred within six months of the onset, from slowly progressing weakness. In very rapid cases the actual cause of the demise is exhaustion of the respiratory muscles or choking from inability to swallow. The longest case so far reported had had the disease at intervals for eighteen years.

Treatment.—The treatment by organic extracts, especially of thyroid gland, was based upon the supposition that the disease originated in a hypertrophy of the thymus gland, capable of being counteracted by the administration of thyroid gland. The theory was as fallacious as the results were disappointing. Strychnine, soamin, and calcium lactate have been employed, the last-named with some apparent benefit. All authorities are agreed that rest in bed, without use of the eyes and without talking, is essential to any improvement.

SYDNEY STEPHENSON.

III.—ABSORPTION OF CATARACT.

- (1) **Paparcone, Ernesto.**—Spontaneous absorption of senile cataract where the lens capsule remained intact. (*Krassorbimento spontaneo di cataratto senile a capsula illesa.*) *Archivio di Ottalmologia*, Vol. XIX, No. 7, Gennaio, 1912.
- (2) **Ewing, A. E.**—Spontaneous complete absorption of the lens; age of patient seventy years. *American Journal of Ophthalmology*, February, 1912.

(1) **Paparcone**, of Naples, relates the facts regarding an interesting addition to the literature of this subject, spontaneous absorption of senile cataract, and draws attention to the fact that, although several such cases have

been recorded, few have been accompanied by notes regarding the histological examination. As glaucoma existed in the eye which is the point of his remarks, the globe was excised, and the pathological findings regarding the lens capsule are recorded and illustrated.

A tabular statement of cases in which such an examination has been made is given. From this it will be seen that in each the epithelial lining of the capsule was found to be either defective or wanting in great part. To this defect, which may be due to degeneration of the cells, the writer attributes the fact of the absorption. LESLIE BUCHANAN.

(2) **Ewing**, of St. Louis, who in twenty-eight years' experience has never seen a similar case, relates that in his patient cataract was known to have been present fifteen years previously, to a degree that prevented her from reading with the eye, and that when examined, no trace of lens could be found. The only evidence that a lens had ever existed was the presence of its capsule. There was no evidence of operation or of injury. The patient and her family said that there never had been any operation, and so far as they knew, there never had been any injury. There was, however, a history of redness and pain in this eye for about a week, four years ago. Ewing makes the very interesting surmise that this may have been due to a rapid swelling of the lens, in the course of which there might have been a minute rupture of the capsule, leading to the admission of the aqueous.

ERNEST THOMSON.

V.—RETINO-CHOROIDITIS (JENSEN).

Groes-Petersen.—Retino-choroiditis (Edmund Jensen). *Klin. Monatsbl. f. Augenheilkunde*, August, 1912.

In 1908, Jensen described four similar cases under the title of "Retino-choroiditis Juxtapapillaris." Briefly, the features of the condition were as follows.—It occurs in young healthy persons. They complain of cloudy vision. In the early stage, there is a rounded, somewhat prominent, soft-edged, whitish patch lying beside the disc. At a later stage it becomes flattened and sharply defined, and presents the appearance of an atrophic patch crossed by some choroidal vessels. Sometimes the retinal arteries which cross the patch are veiled, thin, and partly covered by the infiltrate. Elsewhere the fundus is normal. The visual field shows a sector-shaped defect passing out from the blind spot, and corresponding with the situation of the fundus lesion. The field defect is absolute and stationary. The disease is liable to recur.

Groes-Petersen, of Copenhagen, has been able to trace thirteen additional cases. They differ in some details from the four already published, but resemble them in the presence of the sharply-defined field defect and the tendency to recurrence. Of the total seventeen cases, nine were males and eight females. The ages of the majority were between 20 and 34. Subjectively, all had cloudy vision. Ciliary pain was complained of by four, where there was some evidence of iritis or irido-cyclitis. In all others the eyes were quiet. In all cases there were vitreous opacities, which in three cases were seen to pass from the affected spot into the vitreous. In nine the disease was found as a patch close to the disc margin above, below, or at the nasal side. In three there was one patch close to and another at

some distance from, the disc. In four the lesion was single and peripheral. The disc was always normal. In three cases only was the disease bilateral.

Different views are possible as to the cause of the typical field defect. Jensen was of the opinion that the infiltration, by causing thrombosis of the neighbouring arteries, led to loss of function in the part of the retina supplied by these vessels. The present author finds that the distribution of the arteries of the affected area does not correspond with the field defect, and there is never an ischæmia of the retina such as one would expect to follow vascular obstruction. Groes-Petersen looks upon the field defect as the expression of an inflammatory change in the nerve fibres of the affected area. In his view, the field defect corresponds with the distribution of the nerve fibres which pass through the affected area.

There is a pronounced tendency to recurrence, the recurrences always making their appearance close to the seat of the first lesion. The intervals between the attacks varied from a few weeks up to 32 years. Central vision is affected only so long as the vitreous opacity persist. The prognosis as regards visual acuity is good. No form of treatment seems to affect the course of the disease. The author is unable to throw light on the ætiology. He obtained no proof of a syphilitic or a tuberculous origin.

Groes-Petersen thinks it likely that the lesion is primarily retinal, and that it extends secondarily into the chorio-capillaris. The name chosen by Jensen he considers unsuitable, since the lesion may be in the periphery of the fundus. He prefers to call it simply the "retino-choroiditis of Edmund Jensen."

A. J. BALLANTYNE.

VI.—TUMOURS OF THE CONJUNCTIVA AND CORNEA.

(First Notice.)

- (1) Dupont.—On lipomata of the conjunctiva. (Sur les lipomes de la conjonctive.) *L'Ophthalmologie Provinciale*, juillet, 1909.
- (2) Villard.—Large cyst of the superior cul-de-sac of the conjunctiva. (Kyste volumineux de la conjonctive du cul-de-sac supérieur.) *Ann. d'Oculistique*, septembre, 1909.
- (3) Villardo, A. de L.—Dei tumori benigni della congiuntiva del tipo "dermo-epithelioma" di Parinaud. *Archivio di Ottalmologia*, October, 1909, p. 145.
- (4) Delord and Revel.—On two cases of epithelioma of the bulbar conjunctiva. (Sur deux cas d'épithélioma de la conjonctive bulbaire.) *Ann. d'Oculistique*, décembre, 1909.
- (5) Weiner, M., and Alt, Adolf.—A case of cavernous lymphangioma of the bulbar conjunctiva. *American Journal of Ophthalmology*, January, 1910.
- (6) Lindahl, C.—On traumatic cysts of the conjunctiva. (Ueber traumatische Bindehautcysten.) *Mitteilungen aus der Augenlinik des Carolinischen Medico-chirurgischen Instituts zu Stockholm*, 1910.
- (7) Cunningham, H. H. B.—Epithelioma of the cornea (with plate). *Transactions Ophthalmological Society U.K.*, Fasc. 2, 1910.

- (8) **Steiner, L.**—Two tumours of the caruncle. (*Zwei geschwülste der Caruncula lacrymalis.*) *Centralbl. f. prak. Augenheilk.*, Juni, 1910.

(1) **Dupont** reports a case of pure lipoma of the conjunctiva in a child of four. The tumour was removed by Desbrières (Limoges) and examined microscopically in serial sections. A diagnosis of pure lipoma of the conjunctiva was made, as the authors failed to find any elements other than fatty tissue. The question of the occurrence of pure lipomata in the conjunctiva is discussed.

BERNARD CRIDLAND.

(2) A man, aged 28, consulted **Villard**, of Montpellier, on account of a swelling in the right upper eyelid, which had first been noticed about seven years previously, and which had been rapidly increasing in size for three or four months. Traumatism was denied. On examination, he was found to have a fluctuating tumour which protruded below the palpebral margin so as to cover the upper quarter of the cornea and extended upwards into the *cul-de-sac*. It was dissected out, no trace of pedicle being discovered, and was found to measure 19 mm. by 18 mm. by 17 mm., and to weigh 3 grm. 55. On microscopical examination, the walls were found to consist of connective tissue lined by stratified pavement epithelium, the cells of which resembled those of the bulbar conjunctiva, and showed none of the characteristics of secreting epithelium. The contents of the cyst consisted of a coagulum formed of granules of varying size, some of the smallest of which stained with nuclear dyes and were probably the remains of the nuclei of leucocytes, some of which were seen passing through the epithelium of the cyst wall.

Villard considers that this tumour does not belong to any of the recognised classes of conjunctival cysts, but was due to the embryonic inclusion of an epithelial fragment of bulbar conjunctiva.

R. J. COULTER.

(3) **Villardo** records fully, with plates, the clinical and histological aspects of a case of epithelial tumour with cystic formations, and having given extracts from Parinaud's paper (of 1894), proceeds to show that tumours which are recorded under other names such as "Cystic epithelioma of the conjunctiva," "angioma with cysts," "epithelial cystoma of the bulbar conjunctiva," etc., are related to the primary type. The tumours are thickenings of the conjunctival epithelium and have glandular structures in them which may become cystic. They are usually, if not always, congenital, and probably take on active growth about the time of puberty.

They are probably identical with the "epithelial plaques" described by Hancock and Lister in the *Royal London Ophthalmic Hospital Reports*, 1903, although these authors are not mentioned by Villardo.

LESLIE BUCHANAN.

(4) **Delord** and **Revel** record two cases of epithelioma of the bulbar conjunctiva. The first was treated by exenteration of the orbit, and the second by enucleation, with removal of a large amount of the bulbar conjunctiva. Microscopical examination showed in the first case an epibulbar epithelial tumour leaving the external fibrous coat of the eye apparently intact, but spreading to the interior of the eye, as shown by the presence of Malpighian cells between the fibres of the sclerotic, in the canal of Schlemm, and spreading in a long string from the canal of Schlemm towards the posterior surface of the cornea. In the second case the tumour was localised in the region of the limbus, and spread in an elongated and tortuous fashion between the fibres of the corneo-sclerotic junction, and developed into numerous lobules in the loose connective tissue of the ciliary region, from which it extended forwards into the anterior chamber and backwards behind the choroid.

From a study of their cases and the literature of the subject, the authors

draw the following conclusions. — Malpighian epithelioma of the bulbar conjunctiva usually commences between the cornea and the internal angle of the eye. The development takes place chiefly in the region of the sclero-corneal limbus, but it may spread around the fibrous coat of the eye. In the latter case it may be relatively benign, but the diagnosis as to the seat of the lesion and the prognosis should always be made with the greatest reserve, as the tumour may have penetrated to the interior of the eye. The limbus is the defective part of the shell formed by the sclerotic and cornea, and it is through its lymphatics that epithelioma of the conjunctiva penetrates from the exterior to the interior of the eye. Treatment may consist in excision, followed by scraping, when the cancer rests on the sclerotic; but whenever the limbus is affected, enucleation is indicated.

R. J. COULTER.

(5) The pathological details of the interesting and rare case related by **Weiner** and **Alt** must be read in the original. The growth, in a man aged 30 years, was at the inner canthus, just external to the region of the caruncle. It was almost conical in shape, translucent, and measured at the base 11 mm. horizontally by 6 mm. vertically. The apex extended forward between the lids about 7 mm. or 8 mm. The conjunctiva was generally cedematous and the lids were thickened. The growth, which had never been painful, had apparently been present at birth, but had been increased in size for seven years. It was excised under local anæsthesia.

ERNEST THOMSON.

(6) **Lindahl** (Stockholm).—This paper, which is well illustrated, has no clinical importance, but it is of interest to pathologists.

T. HARRISON BUTLER.

(7) The growth in this case, by **Cunningham**, of Belfast, was a grey, semi-translucent, sharply-defined, sessile body which projected into and covered the inner half of the cornea and extended backwards 0.50 cm. on the conjunctiva. Examined pathologically, it was found to be purely cellular, but although the impression of the pathologist (Symmers, of Belfast) was that it was malignant, he could not be quite sure.

ERNEST THOMSON.

(8) The cases by **Steiner**, of Surabaya, Java, are as follows:

I. **An adenoma of a sebaceous gland.**—This tumour occurred in an old native of Java. The right caruncle formed a tumour the size of a bean. The surface of the tumour was slightly rough and of a reddish-white colour. The tumour itself was freely movable. It was excised and examined microscopically. It showed the typical appearance of an adenoma except in one spot where there is a proliferation and infiltration of the connective tissue and an irregular arrangement of the acini. This might possibly be the beginning of a carcinomatous change.

II. **A retention cyst.**—This occurred in a woman, aged 72 years. At the outer and under side of the caruncle was a small yellow-white tumour, about 3 mm. in diameter. It was well circumscribed, moveable, and of smooth surface. It pushed the punctum forward, so that there was an overflow of tears, although the canaliculus was perfectly patent. The tumour was removed (which cured the lacrymation), and examined microscopically, when it was found to be a cyst lined with several layers of epithelial cells. These cells were small, cubical, stained deeply, and corresponded to the cells of a sebaceous gland.

A. LEVY.

VII.—DISEASE OF THE PITUITARY BODY WITHOUT ACROMEGALY.

Werner, L.—Cases of disease of the pituitary body without acromegaly
Transactions Ophthalmological Society U.K., Fasc. 3, 1912.

Werner, of Dublin, divides the history of the development of knowledge of the pituitary body into three periods. Prior to 1886 there was no definite idea as to the symptoms. In 1886 Marie established the relationship between disease of this body and acromegaly, and soon afterwards gigantism was recognised as due to the same cause. In 1901 Fröhlich described the adiposo-genital group of symptoms, consisting in general adiposity, sexual infantilism, and arrest of growth. To this latter period belong radiography of the sella turcica, opotherapy, radiotherapy and operation.

"The symptoms caused by tumours of the pituitary body are of two kinds, namely, those which are due to the presence of an intra-cranial tumour and are merely the result of the mechanical pressure exerted on neighbouring parts, and those which depend on the altered secretion of the gland. The former are simple and readily explained, whereas the latter are most complex and variable."

The author then discusses the theory of hyper- and hypo-pituitarism, according to which the latter condition checks sexual development and bodily growth in the young, while it merely gives rise to loss of function, amenorrhœa, and impotence in adults; whereas the former produces gigantism in the young and acromegaly in adults.

The cases related, many of them very fully, are as follow:—

Case 1. Tumour of the pituitary body without "glandular" symptoms; bitemporal hemianopsia; hemiopic pupillary reaction as a consensual contraction only; bulbar paralysis. *Post-mortem*.—A solid tumour of a greyish-pink colour, the size of an egg, occupied the sella turcica. . . . The cavernous sinuses contained a gelatinous substance which seemed to be secondary deposits from the tumour, and similar small grey gelatinous-looking nodules were visible on the dura mater opposite the pons and medulla. The pons was considerably flattened. Microscopic appearances seem to have been difficult of interpretation, and should be read in the original.

Case 2. Bitemporal hemianopsia with adiposo-genital type of symptoms; somnolence and subnormal temperature. Patient ultimately lost sight of.

Case 3. Bitemporal hemianopsia; amenorrhœa; moderate adiposity; enlarged sella turcica; remaining half of field normal for past five years. The author suggests a favourable prognosis in this case in view of the stationary condition of the symptoms.

Case 4. Bitemporal hemianopsia; amenorrhœa; adiposity; somnolence and nystagmus. Patient ultimately lost sight of.

Case 5. Bitemporal hemianopsia, at first relative; general adiposity and amenorrhœa in an adult; fatal termination, reported by a relative to have been due to "a cerebral affection."

Case 6. Bitemporal hemianopsia; drowsiness; subnormal temperature; enlarged sella turcica; (?) commencing acromegaly. Patient has lately been taking Armour's extract of pituitary gland (anterior lobe) and says "he feels more life in himself, and more inclined to work than he has felt for the past year."

With regard to treatment, much remains to be accomplished, yet good results have been obtained from opotherapy and operation. Cushing and

Fisher have used with benefit the special extract of the anterior lobe only, and two of the author's patients are at present taking it. Werner considers it too soon to make a definite statement with regard to the results. Operation so far has only given temporary improvements.

Since these patients most frequently come first to the ophthalmic surgeon, it is important to know the many different ways in which the visual field may be affected. Bitemporal hemianopsia is the most characteristic condition. It may be complete or partial, absolute or relative, and in the latter case may exist only in the form of hemiachromatopsia. The defect is frequently absolute in some parts, and relative in others, and islands of retained vision may be found in the blind areas. In the early stages the field may be affected in one eye only, while in the later stages one eye may be blind and the other show an altered field. Other conditions liable to occur are homonymous hemianopsia, paratemporal or bitemporal scotomata, and irregular or concentric contractions.

It may be mentioned that Werner's article is a difficult one to abstract and should be read in the original by those immediately interested in these cases. So many facts and speculations are involved that an abstract, in order to be of real service, would tend to be nearly as long as the original.

ERNEST THOMSON.

VIII.—OPTIC NEURITIS DURING LACTATION.

Villard.—Optic neuritis during lactation. (*Névrite optique dans le cours d'allaitement.*) *Ann. d'Oculistique*, mai, 1912.

Villard, of Montpellier, records two cases of optic neuritis occurring during lactation.—The first patient, aged thirty-six, developed severe pain in the left side of the head, accompanied by dimness of sight in the left eye, after nursing a child for fourteen months. When seen by the author two months later, she was found to have neuritis in her left eye complicated by a small hæmorrhage in the macula lutea. The neuritis yielded to treatment, and the fields for white and colours became normal, but the central vision remained very defective (0.1 eccentric), owing to a central scotomac caused by the hæmorrhage. The right eye was healthy throughout, and had V.=0.8. The second patient, aged twenty-nine, developed severe pain in the right side of her head, chiefly in the temporo-parietal region, a month after her confinement. This was accompanied by failure of vision in her right eye, which increased rapidly from day to day. When seen by the author about a week after the onset of the symptoms, she was found to have optic neuritis in her right eye, without any hæmorrhages. The vision of the eye was 0.1 and its field was contracted. The left eye was normal. Under treatment, the neuritis subsided and the vision of the eye improved to 0.9, with practically full field for white, but slight contraction of the red field and marked contraction of the green field. In both cases the treatment consisted in stopping lactation, lecching the mastoid region, and injection of Neapolitan ointment, while the second patient had, in addition, subconjunctival injections of cyanide of mercury and subcutaneous injections of strychnine, commencing with 1 milligramme and rapidly increasing to 10 milligrammes daily.

The author briefly enumerates the various references to this rare condition which he has been able to discover in ophthalmic literature, and gives a description of the disease founded on the notes of the recorded cases, of which

the following is a *résumé*.—It occurs in primiparæ or multiparæ, commencing usually under thirty years of age, may recur in successive lactations, and may develop within a couple of weeks of the commencement of lactation or be delayed for over a year after it. It may be unilateral or bilateral, and usually starts suddenly with loss of sight with contraction of the visual field and central or paracentral scotoma for white and colours, accompanied by fever, rigors, general malaise, gastric disturbance, and headache. The ophthalmoscopic appearances are usually those of a papillitis, as a rule moderate, but sometimes so severe as to resemble a choked disc, but the neuritis may be retro-bulbar. The diagnosis of the condition is usually easy, but that of the ætiology depends on the exclusion of the other possible causes. The prognosis is relatively good, but permanent defects in the peripheral colour fields are often left. The theory as to the pathogenesis of the condition which finds most support at present is that which ascribes it to auto-intoxication.

R. J. COULTER.

IX.—ALBUMINURIC RETINITIS.

(Concluded.)

Rochon-Duvigneaud.—Albuminuric retinitis. (*Rétinite albuminurique.*)
Bull. et Mém. de la Société Française d'Ophtalmologie, 1912.

2. Albuminuric Retinitis.

(Non-Gravidic.)

According to **Rochon-Duvigneaud**, of Paris, the lesions of the eye are not autonymous, but are the direct consequence of those of the kidney, and recover when the kidney has resumed its normal functions. The proof of the dependence of the one on the other, however, is not so often apparent in non-gravidic as in gravidic retinitis. In the former, cure is unusual, and the patient, who retains his eye symptoms to the end, almost always succumbs to a rapid progression of renal insufficiency. At the same time, if cure be rare, it is nevertheless proved that when a nephritis accompanied by retinitis gets well, or undergoes an improvement of a certain kind, the ocular lesions become cured consecutively. The subordination of the retinitis to the nephritis, then, is of the same order and possesses the same value as that frequently seen in "*Eclampsisme*."

Even in pre-ophthalmoscopic days, the frequency of visual defects in the course of renal affections was known to Bright (1836) and Landouzy (1849). Türck (1850), Virchow (1855), and Lecorché (1858) attributed these disturbances to the hæmorrhages and the profound degeneration of the retina observed by them during autopsies made upon such patients. The discovery of the ophthalmoscope by Helmholtz, however, led to the retinal conditions being studied exclusively by ophthalmic surgeons, which accounts for the fact that since that epoch all important work upon the subject has been done by ophthalmologists.

Certain writers, as, for example, Karl Theodore of Bavaria (1886), von Michel (1899), and Greeff (1903), finding vascular changes in retina and kidney, concluded that the same general cause determined the lesions in those two

organs, so that the retinitis and the nephritis were subordinate not one to the other, but were concomitant and co-ordinate, as it were. But this is merely to ignore clinical facts, and to call in question once again a dependence that has been proved up to the hilt, if only by the history of the retinitis of pregnancy. We must not ask from the dead body, with inert lesions, a question that can be answered only by reference to the living body, with active functions. It has been demonstrated by the researches of Opin and Rochon-Duvigneaud* that all the organs of patients dead from Bright's disease may be sound with the exception of the kidney, the retina, and the heart, and the last-named is simply hypertrophied. Rochon-Duvigneaud believes that a humoral change—that is to say, an intoxication—is much more likely to form the intermediary whereby lesions of the kidney determine those of the retina.

Relative to the vital prognosis of renal retinitis, Rochon-Duvigneaud quotes the figures given by Bull (1886), Miles Miley (1888), G. Possauer (1894), F. von Fleet (1895), Ridley, Trousseau (1896), Haehnle (1897), Elschmig (1903), Schlisma Gornstein (1910), and Rabinowitch (1910). He does not summarise these figures, but contents himself with pointing out that two reasons may be invoked to explain cases where life is prolonged for many years after discovery of the retinal affection.—First, the nephritis may clear up, and life be thereby prolonged for a wholly indefinite period. In this way he would explain a case mentioned by H. Dor (*père*) where a patient survived for thirty years, although known to suffer from renal retinitis. Secondly, there are cases, as it were, of mixed retinitis, developed in patients whose arterial tension is lower than usual in ordinary Bright's disease, and in whose urine albumin or sugar are found simultaneously or successively. Such patients, although they may become purblind, often live for many years.

Albuminuric retinitis is quite exceptional in children, and is rare from 10 to 20 years of age. Between 20 and 30 years it is relatively common, and it reaches its maximum between 30 and 40 years. It then becomes progressively rarer with advancing age. The malady is commoner in men than in women.

In an interesting chapter Rochon-Duvigneaud traces the recent advances made in France regarding the physiology and pathology of the renal functions in their relationship to the composition of the blood, the retention of various products, the discharge into the tissues of the non-eliminated elements, and, finally, to the production of oedema. Widai, knowing the gravity of retention of urea in the blood, and recognising the gravity of albuminuric retinitis, sought to ascertain if the bad prognosis of the latter affection might not be explained by its association with azotæmia. In conjunction with Morax and André Weill, he recently published details of 17 patients suffering from albuminuric retinitis. Of that number 11 showed an azotæmia exceeding two grammes of urea per litre of blood. Four others had from the first examination a less marked retention (0.96 to 1.67), and in two of the patients the amount was 0.76 to 0.57 of urea. Of the 17 patients the gravity of the prognosis, as shown by the state of the retina and the blood, was speedily justified, since 1 died in three days and 12 of the others in from five to thirteen months. Of the remaining 4 patients, some could not be followed, and the others were still alive when the communication was made.

These suggestive researches have been continued by Widai and Weill, with the following results.—Among 166 patients with Bright's disease, they

* For abstract see THE OPHTHALMOSCOPE, 1904, p. 320.

discovered 103 with azotæmia, of which number 54 were already affected with retinitis, or became so later. In other words, they found retinitis in 32 per cent. of all cases of Bright's disease, and in 52 per cent. of those affected with azotæmia. These figures are at variance with the ordinary ones, according to which retinitis is present in from 6 per cent. (Wagner) to 31 per cent. (Eales and Galezowski) of patients affected with nephritis. The point to determine in future is the proportion of retinitis among the cases of azotæmia. Widal and Weill make the important observation that among those who suffer from chronic Bright's disease, the appearance of a retinitis is often the first symptom that clinically betrays the existence of azotæmia.

Two of Rochon-Duvigneaud's pupils, Drs. Onfray and Balavoine, have studied the viscosity of the blood in cases of albuminuric retinitis, employing for the purpose the "Viscometer" designed by Walter Hess. Among such patients they have found a feeble viscosity. Hypo-viscosity in these cases was often enough absolute, but it was invariably relatively feeble as compared with the arterial hypertension. Lessened viscosity of the blood, which presents a certain parallelism with the other retentions, chloridic, uræmic, and toxic, carries with it clinically a bad prognosis. Its estimation may therefore become a convenient means of following the progress of a renal insufficiency, and of rendering the general prognosis of albuminuric retinitis more precise.

Rochon-Duvigneaud remarks that the arterial tension in cases of nephritis unaccompanied by retinitis, is very high in old persons and not so high in young and middle-aged persons, whereas it is always very high in individuals of all ages when the nephritis is associated with retinitis.

The functional symptoms of albuminuric retinitis consist, essentially in conformity with the distribution of the retinal lesions, in an enlargement of the blind spot of Mariotte and scotomata, central or paracentral, together with integrity of the peripheral limits of the field of vision. Speaking generally, there is less reduction in visual acuity than would be supposed from the ophthalmoscopic appearances, the reason being that the latter represent degenerative rather than destructive lesions. Except in rare cases, the patients retain at least enough sight to guide themselves about. That the peripheral limits of the field are retained, tells against the arterial theory of the retinitis, inasmuch as all arterial obliteration necessarily determines the functional suppression of the region irrigated by the blood—that is to say, a larger or smaller encroachment upon the visual field. The sudden onset of the retinitis, not infrequently observed, corresponds well with the notion of a toxic discharge of the blood into the tissues. A certain number of instances of glaucoma, uni- or bilateral, have been observed in the course of the choroido-retinitis which is sometimes seen in Bright's disease. Detachment of the retina is, however, a commoner complication and one that depends more certainly upon albuminuric retinitis. It is especially apt to supervene during the last days of life. One or both eyes may be affected. There is no evidence to prove that there is always a fall in sight when the patient is *in extremis*. As a rule, albuminuric retinitis progresses more or less quickly towards a fatal issue. The cases of cure reported respectively by Michaelsen (1888), Adamük (1889), and Zirm (1901) are not regarded as conclusive. But Rochon-Duvigneaud mentions a case of his own where such an event may have taken place, although its history extends over a few months only, and at the date of the last examination, one or two tiny white spots still remained in the macular region. Apart from the retinitis, there is evidence of a connection between the length of survival of life, on the one hand, and the amount of urea retained by the blood, on

the other. According to some recent figures by F. Widai, dealing with 18 cases of Bright's disease, if the amount of urea exceeded 2 grammes, the patients did not live longer than 7 months and 13 days; above 3 grammes, the maximum survival did not exceed 5 months and 10 days; while it was only when patients were dying that a retention which exceeded 5 grammes was found.

Albuminuric retinitis is regarded by Rochon-Duvigneaud as a kind of exanthem, which extends circularly around the optic disc for a distance of from three to five disc-diameters. In rare cases, however, the ophthalmoscopic changes may exceed even the limits of the field accessible to the ophthalmoscope. But that is quite exceptional. The point characteristic of albuminuric retinitis is that the lesions commence around the optic disc, and later extend more or less towards the periphery. Beyond that, the retina possesses a normal appearance. In typical cases we never see islands of disease surrounded by healthy retina. There are good reasons for believing that, on occasion, important lesions, such as greyish exudations, may make their appearance in a few days or perhaps even in a few hours. The ophthalmoscopic appearances are not constant enough to allow us to make a diagnosis of albuminuric retinitis from examination of the eye alone, since a very similar picture may be found in the course of some affections other than Bright's disease. For example, it may be met with in the retinitis due to diabetes, arterio-sclerosis, anæmia, chlorosis, cancer, and leucaemia, and particularly in some cases of cerebral tumour. Only the general characters of the retinitis remain constant, *viz.*, a dull or oedematous zone around the optic disc, which is infiltrated with whitish exudations or hæmorrhages, along with integrity of the peripheral and equatorial parts of the retina. Rochon-Duvigneaud regards those forms of disease accompanied by hæmorrhages extending to the limits of the ophthalmoscopically visible field as more in the nature of a local vascular affection, due to arterio-sclerosis, than as the outcome of actual toxics from a diseased kidney.

The most elaborate part of Rochon-Duvigneaud's work is perhaps that which deals with the pathological anatomy and the histo-chemistry of albuminuric retinitis.

In albuminuric retinitis the papilla, in a manner of speaking, may be said to lie between the Devil and the Deep Sea, the former being represented by the diseased retina and the latter by the sheaths of the optic nerve which are sometimes distended by fluid. There is no direct connection between the two things, but each of them may influence the disc after its own way, so that if slight swelling of the papilla may be explained by participation in the retinal œdema, pronounced swelling may be the result of an excess of cerebro-spinal fluid in the sheaths of the optic nerve.

Albuminuric retinitis is characterised by the abundance of the exudations which escape into the retina and by the detachments which may result from them. The exudations, when slight, may remain confined to the retina, or, when more abundant, they may cleave that membrane into two parts or may separate it from the choroid. The exudations consist of fibrinous coagula, which exist alone in cases of "white retinitis," and associated with blood corpuscles in the ordinary form characterised by white and red areas. On the other hand, the exudation that so often detaches the *limitans interna* appears to be of a different nature, since it is made up of "*boules sarcodiques*," believed not to be in the nature of an exudation from the blood-vessels but to originate in an alteration of the nerve-fibres, giving rise to a kind of pathological excretion. By special methods of staining (for example, osmium) we find vesicular cells containing black or grey grains, the "*Fett*

Kornchenzelle” of the Germans. They may occur throughout the retina among the fibres undergoing gangliform degeneration, but are especially common from the internal plexiform layer to the external granular layer, and may even extend into the choroid.

Globular hæmorrhages may be found occupying different layers of the retina. In general, they include few if any fibrinous plexuses, much as the latter themselves contain few if any blood corpuscles. These fibrinous plexuses, therefore, do not represent former effusions of blood.

The fact that vascular lesions are inconstant is enough to prove that they are not necessary to the development of retinitis. If they play any part in the retinal lesions, it is assuredly, in Rochon-Duvigneaud's opinion, a secondary one. The arteries, arterioles, and capillaries are more affected than the veins. The changes consist in a thickening of the vessel walls, often beginning in the middle coat, which may in that way become transformed into a homogeneous mass, towards the centre of which remains of endothelial cells and blood corpuscles represent all that is left of the lumen of the obliterated vessel. The venous lesions, according to Vennemann, consist especially in narrowing and obliteration by hyaline thrombosis and endothelial proliferations. These venous changes have been regarded as more frequent than the arterial ones (Leber). That the principal arteries are seldom if ever affected by the obliterative lesions is, however, better shown by the retention of sight, even in cases of retinitis with gross ophthalmoscopic changes, than by the examination of hundreds of pathological sections.

Disseminated areas of gangliform degeneration may be found in the course of the nerve-fibres. Such a fibre isolated and seen in its length, will have a fusiform or moniliform aspect, but in transverse section, it may simulate a ganglionic cell, with its cytoplasm and nucleus.

In brief, then, the preponderating pathological lesions of albuminuric retinitis are the globular and especially the fibrinous exudations. The fibrinous nature of the reticulated exudations cannot be doubted, and their coagulation cannot be due to any reagents employed, if only because they were found by Lauber and Adamük in frozen preparations, where they had the same appearance as in all preparations, irrespective of the fixing agent employed.

Owing to the pathological lesions, such as thickened vessels, found in the choroid of eyes with albuminuric retinitis, the name “albuminuric chorio-retinitis” has been suggested (Galezowski, Elschnig). In the course of a nephritic affection of the fundus, however, the choroid seldom becomes visible with the ophthalmoscope, inasmuch as it is rare for the retinal pigment to become so rarefied as to allow the under-lying choroid to be seen. But vascular lesions are more widely spread in the choroid than in the retina. They involve the arterioles and capillaries more than the venules. The thickening may be due to (*a*) degeneration of the endothelium, or (*b*) the penetration into the vessels of migratory cells, charged with fatty granules. A homogeneous degeneration, which begins in the middle coat, may crowd the endothelium together, and end by obliterating the lumen of the vessel. In other cases, all the tunics became dissociated, whereby the vascular walls are considerably thickened and the narrowing or even the obliteration of the lumen of the vessel may be determined. Despite these changes, the choroid itself presents much less modification than does the retina in cases of albuminuric retinitis. This fact must be explained by the comparative richness of the two vascular systems, and particularly by the terminal arrangement of the retinal arterioles as opposed to the numerous anastomoses of those of the choroid. Hæmorrhages are much less frequent in the retina than in the choroid. In many cases the choroid is invaded by an abnormal accumulation of non-pigmented round cells, such as are found in chronic inflammations.

Since the pigmented epithelium is but rarely separated from the retina by an exudation, and since small retinal detachments are much commoner, especially in the macular region, the author concludes that exudations are more frequent from the retina than from the choroid. He discusses at some length the origin, &c., of the grains of brown pigment found in the substance of the retina, sometimes free and at other times contained in the migratory cells.

Rochon-Duvigneaud sums up the processes in the following way.—A plasmatic exudation, with or without globular extravasation, into the substance of the retina, together with an obvious tendency of those exudations to fuse towards the choroidal layers of the retina. Coagulation, resorption of the serum, which leaves fatty matters under the form of more or less diffuse disseminated tiny drops; persistence of the fibrinous clot, at first as networks, then as homogeneous blocks, the absorption of which goes on slowly by a kind of degeneration or by cavitation (*yeux de fromage*, from its likeness to the holes in Gruyère cheese). Migratory cells play a part from the beginning of the process, resorbing the disseminated droplets of fat, and disposing themselves around the fibrinous blocks, in the absorption of which they seem to take a share. How are they eliminated? It is a curious thing that they are often found within the choroidal vessels, arteries and veins, and the presumption is that they are got rid of in that way.

The solution of the problems which surround albuminuric retinitis is likely to be found, so Rochon-Duvigneaud believes, in a comparison of the histological and histochemical changes that occur in kidney and retina. Modern research has shown that the nephritic kidney contains certain specific substances analogous to fat. It is also known that the retina in albuminuric retinitis includes fat. The question is, whether in addition to ordinary fatty substances, the diseased retina includes lipoid, which has been shown, by the investigations of Stoerk, to occur in nephritis as a specific product. That "Protagon" is a normal constituent of the central nervous system is known, and the same substance is found in tumours, in atheromatous alterations of the vessels, and in the supra-renal capsules, although not in the kidney itself. In nephritis, especially in the "large, white kidney," an analogous product appears, which was at first mistaken for "Protagon," but it is distinguished by the absence of nitrogen and phosphorous. To this substance the name "Lipoid" was applied by Kaiserling. Its polariscopic appearances and its staining reactions are distinctive. In looking for it, recent pieces of tissue, or tissue fixed only in formol, must be employed. In celloidin sections it occurs not as birefringent masses, but as large clear cells arranged in masses or circles, which, under a low power of the microscope, show a likeness to ordinary fatty tissue. The appearance of this substance, both in kidney and retina, speaks in favour of the co-ordination and specificity of the disease process. The histological appearances of lipoid in the retina suggest that it is formed *in situ* rather than that it is derived from the retinal or choroidal blood-vessels. This lipoid is considered by Chauffard as being in the nature of cholesterin or of one of its derivatives.

To this chapter of his work, Rochon-Duvigneaud appends a note by Dr. J. Mawas, dealing with the chemical reactions and so forth of the lipoids found in the normal retina of man and other mammals.

An interesting chapter is devoted to explaining the ophthalmoscopic appearances by reference to the pathological lesions found in cases of albuminuric retinitis. The so-called "macular star" is formed by the homogenous blocks resulting from the contraction of the fibrinous clots. Situated, as they are, in the layer of nerve fibres which radiate from the centre of the macula,

these deposits must of necessity assume a radial disposition (Nuël). In such a case, where the star was incomplete, Rochon-Duvigneaud found fibrinous particles, lying partly in the nerve-fibre layer and partly at a deeper level in the external granular layer. The "macular star," as a rule, represents a regressive stage following a diffuse infiltration of the macula. The appearance of a greyish opalescence, seen with the ophthalmoscope, probably represents zones of diffuse fibrinous infiltration. When particles of a pure white appearance are found intermingled with the greyish opalescence, it is probable that they represent fibrinous blocks, like those responsible for the "macular star." The large, white banks of opacity, sometimes likened to a cumulus cloud, probably represent more or less heaped-up fibrin. The fat, of which we hear much in pathological description, probably plays but a small part in the production of the ophthalmoscopic picture, since it exists in the state of extremely small granules. When massed, however, these granules may account for glistening particles, the so-called "microscopic brilliants," sometimes observed here and there in the bank-like clouds of white opacity. The gangliform degeneration of the nerve-fibres may reveal its existence ophthalmoscopically under the guise of white spots radiating from the optic disc, and arranged almost like opaque nerve-fibres. Finally, an important place in the ophthalmoscopic picture must be assigned to detachment of the internal limiting membrane by *boules sarcodiques*, which may veil the vessels, and communicate a milky aspect to large tracts of the retina.

In discussing the general pathology and pathogenicity of the disease, Rochon-Duvigneaud again protests against the view expressed by certain German writers, *viz.*, that the retinal and the renal changes are dependent upon a common factor in the shape of arterio-capillary fibrosis. The retina is, in point of fact, affected at a distance, and not through the intermediation of a lesion distributed over the whole body. Nephritis and retinitis are not two co-ordinate lesions—that is to say, both determined by the same general cause acting independently upon the retina and the kidney. On the contrary, the retinitis is subordinate to the nephritis, a fact of which clinical workers must constantly remind those pathologists who wish to understand the connection between the lesions by the study of histological specimen.

To attribute the changes in the retina to a special affection of the retinal vessels is to explain nothing and, indeed, to shirk an explanation. The proved existence of retinitis with few or no vascular lesions (Kunz, Cirincione, Opin and Rochon-Duvigneaud, Schieck, Leber, etc.) renders useless any longer discussion as to the pathological value of such inconstant modifications of the retinal vessels.

Ought we to continue to say that the renal lesion is capable of provoking retinitis when it has reached an advanced stage, the anatomical phase of the granular contracted kidney? Certainly not, for that is to substitute the lesion for the disturbance which it determines and which is the essential thing. It is demonstrated that the diseased kidney acts upon the retina by a certain kind of eliminatory inadequacy. If azotæmia, frequent in the granular contracted kidney, is almost always the cause of it, azotæmia, uncommon in gravidic and scarlatinal nephritis, may also be accompanied by retinitis. We conclude, then, that there is a certain kind of renal insufficiency, due to the retention of urea or of something which is intimately associated with it, to which the retinitis is subordinate, and not to a certain state of the kidney, the granular contracted kidney, which is merely its cause in the sense that is the common substratum of azotæmia. Besides, to say that retinitis is associated with azotæmia is to make a clinical declaration, and nothing more, but indeed we can go no farther. Widal never said that retinitis was provoked by an

excess of urea in the blood, and for that matter he carefully guarded himself from any pathogenic interpretation of the kind.

The urea known to be present in the blood does not act directly upon the retina. The retinitis often lasts for a much longer period (one to two years) than that of marked azotæmia (a few months), and the ocular affection may begin at a time when the overplus of urea is still small.

The idea that albuminuric retinitis may be due to the local deposit of cholesterin, as suggested by certain investigations into the blood made by Chauffard, is not entertained with favour by Rochon-Duvigneaud, who at most admits that this suggestive hypothesis may open up new and fertile fields of investigation.

The treatment of albuminuric retinitis is essentially that of the azotæmic period of nephritis, and exceptionally only that of certain complications, as glaucoma. The management of azotæmia includes: (1) a *régime* such as will allow of the best possible action of the kidney; and (2) symptomatic treatment in the presence of uræmia, threatened or present. The first indication is best met by prescribing food in which the albuminoids do not exceed 50 to 60 grammes a day (Widal). Milk given to the extent of 21½ a day contains 87 grammes of albuminoids, which is too large an amount. It is true that a milk diet often gives good results, but that is simply because it succeeds an ordinary *régime*, which is toxic as regards the patient, and to which it is clearly superior. The quantity of milk given daily should be restricted to about half a litre, and the rest of the food should consist of potatoes, rice, wheat, barley, and maize, or such vegetables as salads, spinach, carrots, and peas and fruit, or such fatty substances as butter, cream, and white cheese. Ordinary bread may be taken. A very sparing use should be made of salt. When uræmia is actually threatened, the patient should take nothing for the first twenty-four hours or longer except lactose-water, since accumulation of toxic substances in the blood may be avoided in that way, while urinary depuration is facilitated. In cases of chronic uræmia, lactose-water taken for several days, and combined with copious purgation, acts well. Blood-letting and lumbar puncture often relieve intolerable headaches. Syphilis, if present, must be most carefully treated, for it is known that retinitis, both acute and chronic, may result from that infection.

Discussion.

A. Terson, of Paris, had once observed the cure of a case of albuminuric retinitis. The patient was a man of seventeen years, suffering from scarlatinal nephritis. The nephritis and the retinitis had lasted for about one year. The sight became normal, and nothing remained of the retinitis except a few tiny pigmentary spots. Cure has already lasted for several years. As regards vital prognosis, almost all of those affected die in two to three years after the first discovery of the ocular lesion. Men succumb sooner than women, and the rich have a much better chance than the poor. Terson has seen persistent bleeding follow the use of leeches in these cases. He rejoices that patients with Bright's disease are now permitted to vary their diet, instead of, as formerly, leaving them impaled upon the horns of the cruel dilemma: "*Le lait ou la mort.*" Chloride of calcium in doses of from 30 cgr. to 1 gramme, administered four days a week, has sometimes a surprising effect in reducing the albuminuria and in increasing the elimination of chlorides. Other remedies that should not be neglected in these cases are small doses of the iodides, as strontium iodide, iodine, and tannin, and the lactate of strontium. In dealing with crises of hypertension, superadded to permanent hyper-tension, nitrites, trinitrine, and mistletoe are of service.

Professor Chauffard (who spoke by invitation of the Society) described some recent investigations dealing with the pathogeny of albuminuric retinitis. An excess of cholesterin ("*hypercholesterinæmia*") was always to be found in such cases. This discovery led him to suggest that the excess of cholesterin might have something to do with the pathogeny of the retinal changes, in particular with the white, cumulus-like clouds, which gave so special a character to the ophthalmoscopic image. He supposed that the retinal *plaques* might be the result of a local deposit of cholesterin. He saw in the histological investigations of Lauber and Adamük (1909), a confirmation of his views. According to those authors, the so-called fatty *plaques* of the retina were lipoid *plaques*, characterised by a peculiar reaction to Sudan III and to osinic acid, and possessing certain curious optical qualities. These reactions were those of the ethers of cholesterin. But, in Chauffard's view, another factor is necessary for the production of the fibrinous and exudative *plaques*, namely, a disturbance of the retinal circulation. This is seen in the forms which commence as neuro-papillitis, accompanied by peripapillary oedema. In the determinism of these accidents, Chauffard attaches importance to hypertension of the cerebro-spinal fluid. The condition which underlies the circulatory disturbances and the excess of cholesterin may be of supra-renal origin. Chauffard sums up the matter, from his point of view, in the following words:—"Retinal circulatory disturbances and *hypercholesterinæmia* explain the pathogeny and the character of albuminuric retinitis, the prognosis of which is given by azotæmia."

Mawas, of Paris, does not believe that the white *plaques* of albuminuric retinitis represent a deposit of cholesterin. The lipoids of the blood and retina undoubtedly play a part in the evolution of the retinitis, but the part is quite a secondary one. The appearance of cholesterin in the eye succeeds lesions of the uveal tract or retina. Mawas was disposed to think that the pigmented epithelium possessed a certain importance in the production of extra-retinal exudations, as well as in the detachments so often found in albuminuric retinitis.

F. Terrien, of Paris, rather questioned whether retention of the pupillary light reflex was so good an omen as Rochon-Duvigneaud seemed to think. At all events, in four cases of gravidic retinitis, which ended in death, the pupillary reflexes were quite good. He quoted a case in which, although vision rose in a few months from 1/10 to 1/3, the patient succumbed to uræmia a few weeks later. Terrien suggested the possibility of every case of albuminuric retinitis beginning with optic neuritis.

Nuël, of Liège, agreed in thinking that the vascular changes were not primary in albuminuric retinitis. The sclerotic lesions of the vessel walls were rather the consequence than the cause of the retinal alterations. He insisted that the "macular star" was due to the appearance of globules of an albuminoid substance in Henle's layer, the peculiar disposition being conditioned by the anatomical arrangement of the part. He urged that the old pathogenic theory, which attributed the retinitis to retention of sodium chloride and the retinal oedema resulting from such retention, should not be cast wholly on one side.

In criticising Rochon-Duvigneaud's rejection of the vascular theory, **Morax**, of Paris, pointed out that the mere absence of vascular lesions in histological specimens was not conclusive. The evidences of circulatory disturbances were to be found in the hæmorrhages and oedemas. We know that retinal lesions identical with those of albuminuric retinitis may be present in diabetes, arterio-sclerosis, and syphilis, and that the vascular changes in those conditions are primary. The analogy is very striking. Morax himself has found

numerous and important vascular lesions of the retina in the specimens he had examined of albuminuric retinitis, although he admitted that all the cases were of several months' standing.

Wicherkiewicz, of Cracow, had had under observation for upwards of eight years a woman suffering from albuminuric retinitis. He mentioned a case presenting all the ophthalmoscopic signs of an albuminous papilloretinitis, but not associated with albumin in the urine. The Wassermann reaction was positive, and specific treatment was instituted with good effects.

SYDNEY STEPHENSON.

X.—THE CASE OF "GENERAL" BOOTH.

Higgins, Charles.—A note on a case of double cataract: the case of General Booth. *Lancet*, October 19th, 1912.

Higgins, of London, has considered it "almost a public duty" to record the clinical history of "General" Booth's case.

Both operations were smooth, yet both eyes became infected. The first operated eye became infected secondarily after eight months, as the result, it is supposed, of going about the country in a motor car, and being much exposed to wind and dust. The cicatrix had always been weak. The second operated eye was infected primarily, on the third day. Both eyes were totally lost in spite of every precaution on the part of the surgeon. The first eye was probably infected owing to the negligence of the patient himself to act according to definite instructions, and to accept the definite warnings of the surgeon. How the second eye was infected is not known. Higgins supposes the existence of "a septic diathesis."

ERNEST THOMSON.

XI.—ENUCLEATION IN CASES OF PANOPHTHALMITIS.

- (1) **Darrieux**.—Enucleation in the treatment of panophthalmitis. (L'énucléation dans le traitement des panophtalmies.) *Ann. d'Oculistique*, mars, 1912.
- (2) **Jacqueau**.—Intense meningitis after enucleation of the eye for post-traumatic phlegmon. (Méningite suraiguë après énucléation de l'œil pour phlegmon post-traumatique.) *La Clinique Ophtalmologique*, 10 août, 1912.

(1) **Darrieux** has found among 240 enucleations performed under aseptic precautions in the ophthalmic department of the Lariboisière since 1903, that forty-two were for panophthalmitis. In thirty of these the inflammation was due to traumatism or corneal infection, and there was no death, although the globe was perforated during the operation on four occasions. In the remaining twelve the panophthalmitis was metastatic and there were three deaths, which were shown at the autopsies to have been due to the general infection (one case of ulcerative endocarditis, one case of pneumococcic septicæmia, and one case of tuberculosis) and not to the enucleation. He concludes that under aseptic conditions, enucleation is free from risk in panophthalmitis of external origin and constitutes the treatment of choice

while in metastatic panophthalmitis it does not aggravate the prognosis, which depends on the general infection, but has the merit of relieving pain, and at times of improving the course and duration of the disease by removing a purulent focus.

R. J. COULTER.

(2) The important case reported by **Jacqueau**, of Lyons, can be summed up in a very few words.—A man of 30 years received an injury with a piece of metal, for which enucleation was advised. He refused, remarking, as indeed so many people are apt to remark, "that the eye could be taken out when it began to do harm." A week later, panophthalmitis having supervened, enucleation was performed with all antiseptic precautions. On the third day after the enucleation the patient died of very acute meningitis, although the orbit had not become in the least involved. No *post-mortem* and no bacterioscopic examination of the pus or of the meningeal exudate. The author reflects upon the vicissitudes of the operation of enucleation during panophthalmitis, which passed into disuse as the results of the "anathema" of von Graefe, and was re-established by Panas, only to suffer partial eclipse as the result of the work of Terson in 1908. We fear the author begs the question when he concludes to remain faithful to the operation, *provided it can be done before the onset of distinct panophthalmitis (avant même l'écllosion de la panophtalmie franche)*.

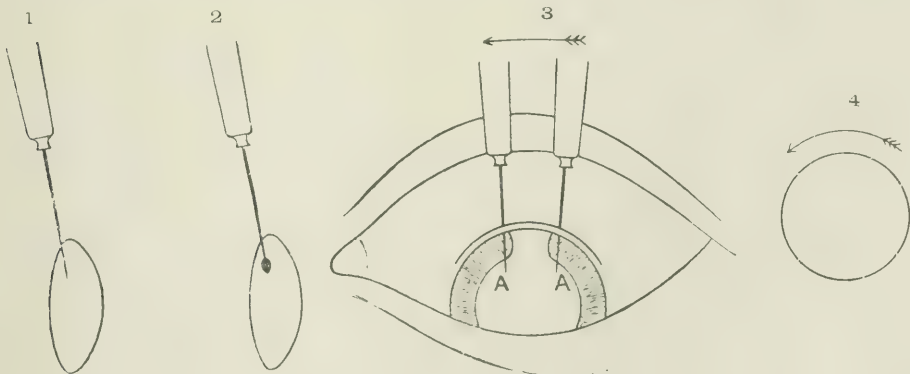
ERNEST THOMSON.

XII.—A NEW OPERATION FOR CATARACT.

Hosford, J. Stroud.—On a new method of extraction of cataract in the capsule. *Transactions Ophthalmological Society U.K.*, Fasc. 3, 1912.

Hosford, of London, has extracted nine lenses in the capsule by a new method. Exact statistics are not given.

The method consists in rotating the lens in its capsule around its antero-posterior axis in such a way as to rupture the zonule. The lens is then easily



1. Introduction of needle through wounds and into lens, flat surface foremost.
2. Needle twisted so that flat surface helps to rotate the lens without unduly lacerating lens.
3. Rotation of lens by moving needle from first position to second position, *i.e.*, from one angle of wound towards the other, the needle-handle being vertical.
4. To show wheel-like rotation of lens.

extracted in its capsule without dangerous force being employed. Prior to opening the eyeball, the pupil has been thoroughly dilated with atropine. A preliminary iridectomy may or may not have been done. Indeed, an iridectomy is not necessarily performed at all. At any rate, the iris being well out of the way, one needle, or sometimes two needles, are passed through the upper margin of the cornea into the anterior surface of the lens, and by this means the lens is rotated. The manoeuvre may also be carried out, as shown in the third figure, after the section has been made. The author says that if atropine be properly instilled, and the rotatory method carefully done, the aqueous humour is never lost sufficiently to preclude an accurate and neat section of the globe being made, and lens and capsule, whether hard, gummy, or soft, can be extracted *en masse* without any force whatsoever, with or without a preliminary iridectomy. ERNEST THOMSON.

XIII.—DYSTROPHIA MARGINALIS CORNEÆ

- (1) Hoppe, J.—A clinical contribution to our knowledge of dystrophia epithelialis corneæ (Fuchs). (Klinischer Beitrag zur Kenntniss der Dystrophia epithelialis corneæ [Fuchs].) *Klin. Monatsbl. f. Augenheilk.*, Februar, 1912.
- (2) Junius.—Dystrophia marginalis corneæ in a young man. (Dystrophia marginalis corneæ bei einem jugendlichen Manne.) *Zeitschrift für Augenheilkunde*, Juli, 1912.

(1) Hoppe, of Cologne, is in a position to describe a case of this interesting affection, which was under observation for ten years, and in which the development of the condition could be traced in one eye from its commencement. The patient, a man seventy years old, had a small, horizontally oval, opacity in the lower part of his right cornea. Surface uneven, and showing small dark points under the *loupe*. Pupil small, and not easily dilated with mydriatics. Tension normal. Cornea sensitive. Subjective symptoms very slight. The opacity extended, and small vesicles and pits appeared from time to time on the surface and edge of the opaque area. After temporary subsidence, with reduction in the size and density of the opacity, there were several relapses with more or less severe subjective disturbance and steady extension of the opacity. Eighteen months after the first observation, corneal insensibility was first noted. Three and a half years later, the bulbar conjunctiva became insensitive, and it gradually assumed a dirty yellowish-white or yellowish-grey colour, the visible vessels being few and narrow. By this time the whole cornea, with the exception of a margin about one millimetre broad, was opaque and uneven. Seven years after the patient was first seen, the left eye became painful, and the vision a little dim. A narrow linear opacity was found crossing transversely just below the centre of the cornea. The eye was quiet in five days. There were repeated complaints of diminishing vision, due, at least in part, to increase of myopia. In the course of the next three years, corneal opacity spread and underwent certain changes, but usually presented a number of clear black vesicles intermingled with a fine greyish opacity. At the date of the last observation, the opacity of the right cornea had cleared considerably, but leaving a very irregular surface, while the left cornea was smooth and only faintly opaque. Shortly thereafter the patient died.

Important points in this disease are the age of the patient, the very slow course (it reached the summit of its development fifteen years after the earliest

subjective symptoms), the reduced sensibility of the cornea (which in Fuchs' cases was present at the beginning, but in this case, began eighteen months later), the smallness of the pupil and absence of response to mydriatics, and the futility of all forms of treatment. The condition of the bulbar conjunctiva in this case has not hitherto been described. A. J. BALLANTYNE.

(2) Those who are interested in corneal disease will read this paper by **Junius**, of Cologne, with much profit. It describes a unique case of marginal keratitis affecting the upper part of the corneal periphery, and causing much distortion. The cornea became greatly thinned, and much irregular astigmatism developed. The disease was something like one described by Fuchs, but there was a definite groove formation. The same was noted in Terrien's case. Junius has so far seen no such groove in his case. The condition is best understood from a study of the coloured plate, which shows a white line in the situation of an arcus senilis. The distortion of Placido's rings is also shown. T. HARRISON BUTLER.

XIV.—THE BIO-CHEMICAL REACTION OF THE LENS.

Reis, W.—The determination of the ripeness of senile cataracts by means of the bio-chemical reaction of the lens. (*Die Bestimmung der Reife des Altersstars auf Grund bio-chemischer Reaktion der Linse.*) *Archiv. f. Augenheilkunde*, Bd. LXXII, Heft ii, September, 1912.

Reis, of Lemberg, avoids the clinical side of the question of the ripeness of cataract, and draws attention to the following question.—Are there any anatomical, physical, or chemical changes in the diseased lens which correspond to the clinical conception of ripe cataract? He notes the difficulty in making a pathological examination of the diseased lens, in that, as Hess states, there is no fixative which does not change the structure and volume of the whole lens.

The changes which take place in senile cataract are of a degenerative character. These originate between the single fibres spaces, some of which are filled with liquid, so that the lens fibres lose their regular structure, and the lens become an indistinguishable pulpy substance, composed of fat, remains of lens substance, and an albuminous liquid. The nucleus, on account of its sclerosis, may not become involved, and may not differ in appearance from the nucleus of a normal senile lens of the same age. The changes in the lens are degenerative ones, with a proliferative action in the capsular epithelium. The degree of ripeness depends upon the intensity and extension of the degenerative action. During cataract formation, the physical properties of the lens change. The affected lens shows a smaller volume than the normal senile lens of the same age (Priestley Smith). There is also at the same period, according to W. J. Collins, a diminution in weight. In the second stage, there is an increase in volume, followed again by a diminution, which is well seen in the hypermature forms.

Reis considers if, besides the anatomical and physical differences in the healthy and diseased lens, there are also differences in the chemical construction of the normal and pathological lens which we could use for the determination of the ripeness of cataracts. **Deutschmann** found that there was a diminution of the water-contents in a cataractous lens; **Jacobson** and **Kuhn**, that the amount of cholesterin increases in the diseased lens. **Cohn** ascertained a diminution in albumin of from 9 to 13 per cent.

Michel and Wagner, in the nucleus of the senile cataract, demonstrated an absence of soluble albumin, with only small traces in the periphery; Leber, an increase in cholesterin and lecithin; Toufescò, an increase in fat-contents, really a fatty degeneration of the lens fibres. Arnold in 1910, made some investigations about the cystin reaction. Reis followed these up, and proceeded in the following way.—Small pieces of lens were dried in the thermostat on a strip of blotting paper, and then moistened with a 5 per cent. nitric-acid-sodium solution. A glass rod was dipped in ammonia, and then applied to the moistened film. The normal lens gave an intense purple-red reaction; both nucleus and periphery gave a positive cystin reaction. Sixty senile cataracts were examined by Reis. In fifty-eight, the periphery and nucleus, gave an entire negative reaction. In the partially ripe cataract, traces of reaction, which corresponded in grade to the degree of ripeness, were found. In two cases of traumatic cataract, a positive reaction was obtained. Jess found albumin gave no trace of a nitro-prussic reaction. To decide whether the different behaviour of the reaction depended upon changes in the albuminous crystals, further investigation is needed. In Reis's examination of four traumatic cataracts, three lenses displaced in the anterior chamber, and for control, one ripe, one hypermature, and three partially ripe cataracts, the following results were obtained.—The traumatic cataract lenses gave a positive reaction. Of the three dislocated lenses, two gave a distinct reaction, one a negative. Reis concludes that the cystin reaction forms a guide to the determination of the ripeness of senile cataracts. In the majority of the clinically ripe cataracts, the cystin reaction was entirely negative, so that we can declare the cataract entirely ripe in which the nucleus and periphery show an entire absence of the cystin reaction. The more unripe a cataract the easier it is to prove a trace of cystin in the peripheral parts. The nucleus, in spite of its slight anatomical and physical changes, is the earliest part to show an entire negative reaction. There is a difference in the behaviour of the nucleus and peripheral parts, in that the former loses the reaction first. This confirms the opinion of Becker, that there exist demonstrable chemical differences between the nucleus of the normal and cataractous senile lens. The early appearance of chemical changes in the nucleus is remarkable when we consider that it is really the most resistant part of the lens, and that it remains apparently unchanged when the lens fibres around it have altered. This behaviour is especially remarkable in Morgagnian cataracts. When we consider that even in the unripe cataract, the nucleus shows the most marked chemical change, we must again agree with Becker, who states that the chemical changes in the nucleus precede by many years those in the periphery. A negative reaction in the periphery of the lens forms an objective criterion for the determination of the ripeness of a senile cataract. HANFORD MCKEE.

XV.—REMEDIES.

(First Notice.)

-
- (1) Clausnizer, Th.—The influence of diathermy on the intraocular pressure. (Der Einfluss der Diathermie auf den intraokularen Druck.) *Klin. Monatsbl. f. Augenheilkunde*, Juni, 1912.

- (2) Domec, Th.—Pressure-massage, myotics, and myopia. (*Massage-pressure, myotiques, myopie.*) *La Clinique Ophtalmologique*, 10 septembre, 1912, and *Bull. et Mém. de la Société Française d'Ophtalmologie*, 1912, p. 611.
- (3) Chevalier, G.—A severe case of pseudo-membranous conjunctivitis cured by serum. (*Un cas grave de conjonctivite pseudo-membraneuse guéri par le sérum.*) *La Clinique Ophtalmologique*, 10 octobre, 1912.
- (4) Whitham, Lloyd B.—Additional experiments on the excretion of hexamethylenetetramine in the ocular humours. *Archives of Ophthalmology*, November, 1912.

(1) Clausnizer, of Tübingen, found that diathermy produced a rise of tension in inflamed eyes (cases of iridocyclitis, chronic iritis, inflammatory stage of keratitis profunda), but led rather to a fall of pressure in non-inflamed eyes, both diseased and normal. For example, a case of tuberculous disease of the uveal tract, in which the normal tension ranged between 13 and 18 mm. of mercury, showed rises of tension from 18 to 33, 18 to 28, 16.5 to 26, and 13.5 to 22, with applications of diathermy, which caused the conjunctival temperature to rise 4.9° . The possibility of such an elevation of tension should be borne in mind in the use of this form of treatment.

A. J. BALLANTYNE.

(3) In this case Chevalier, of Le Mans, appears to have had a struggle with the practitioner attending the case as to the advisability of using antidiphtheritic serum. As no bacteriological examination was made (apparently owing to the obstinacy of the practitioner aforesaid), it is impossible to say with certainty that the severe conjunctivitis was diphtheritic. After one injection of serum, the practitioner refused to give any more, the eye then became worse. A consultation with Darier was held and the following treatment adopted.—Daily subcutaneous injections of 10 c.c. antidiphtheritic serum, daily administration by the mouth of 10 c.c. serum in draught, and hourly instillation of serum into the conjunctival sac. All the foregoing for three days. At the end of three days the false membrane became detached, leaving a cornea denuded of epithelium. Under further treatment by *lavage*, etc., the eye did quite well.

ERNEST THOMSON.

(4) Whitham, of Baltimore, relying on the strength of certain experiments which go to show that hexamethylenetetramine (urotropine) is excreted as such and as formaldehyde by the tears and aqueous humour of rabbits, recommends the use of that substance before and after operations upon the eyeball, in order to secure an "antiseptic condition." It may also be employed, together with other remedies, in corneal, iridic, cyclitic, and sphenoidal affections.

SYDNEY STEPHENSON.

BOOK NOTICES.

Transactions of the Ophthalmological Society of the United Kingdom.
Volume XXXII, Fasc. 3, 1912. Price, 4s.

This fasciculus, issued to members towards the end of November last, completes the thirty-second volume of the *Transactions* of the Ophthalmological Society. Such of its contents as are suitable will be abstracted in due course in the columns of THE OPHTHALMOSCOPE.

Bulletins et Mémoires de la Société Française d'Ophthalmologie.
 Twenty-ninth year. 1912. Paris: G. Steinheil, 2, Rue Casimir-Delavigne.

This very substantial volume contains an account of the proceedings that took place at the last meeting of the French Ophthalmological Society held at Paris, in May, 1912. Upwards of one-third of the book is occupied with an account of the discussion upon albuminuric retinitis, opened by Rochon-Duvigneaud.

La Rétinite Albuminurique. (Albuminuric Retinitis.) By Dr. ROCHON-DUVIGNEAUD. Paris: G. Steinheil, 1912. Price, 6 francs.

A reprint in book form of the opening address given on renal retinitis by Rochon-Duvigneaud before the French Ophthalmological Society in May, 1912. Its contents have already been abstracted in the columns of THE OPHTHALMOSCOPE (December, 1912, and present number).

The Origin of Myopia. (Die Entstehung der Kurzsichtigkeit.) DR. GEORG LEVINSOHN. Berlin: Verlag von S. Karger. 1912. Price (unbound), 2s. 6d.

Levinsohn believes that axial myopia is caused by the weight of the eye, which gradually stretches at the posterior pole supported only by the optic nerve.

In this book he first of all critically reviews older theories, and then describes his own views, and brings forward some experimental facts to support the latter.

It is, the author states, universally admitted that there is a causal relationship between myopia and near work. Either it directly causes short-sight or increases myopia when myopia is present. Myopia is a school disease, and it is more prominent in schools which make the greatest demands upon the eyesight. In Germany, ever since Cohn drew attention to these facts in 1866, school hygiene has been carefully studied, the schools have been well lighted, and correct posture at the desk has been insisted upon, and yet after fifty years of prophylaxis, myopia is just as common as it ever was. Cohn found in 1866 that 50 per cent. of medical students were myopic; in 1903 he found the same figure. The average degree of short-sight was then, as now, 3D. Levinsohn draws the conclusion that as the measures adopted have had no result, they must have been wrongly conceived or incorrectly carried out. The theories upon which the prophylactic methods were based are faulty and incorrect, and in consequence there has been no appreciable result. It has been suggested that the acts of accommodation and convergence raise the intra-ocular tension slightly, and so cause elongation of the globe. But the careful work of Hess and Heine has shown that the strongest acts of accommodation have no influence whatever upon the tension of the eye, and so accommodation can be excluded as a possible cause of myopia. The external muscles have been said to compress the eye, and so to lengthen it. Stilling lays the blame upon the superior oblique, and he has had many adherents. He believes that the brachycephalic type is more disposed to myopia than the dolicocephalic, because the orbit is lower and the superior oblique can act at greater advantage. Stilling's results have not been confirmed by Schmidt-Rimpler, Seggel, and Kirchner. It has never been proved that myopia depends upon the shape of the orbit, although it is more common in persons with a low orbit

It is a question whether the superior oblique acts at all when the eyes converge upon a book; in any case its contraction is minimal. The changes found in the myopic eye do not support the view that they are caused by increased intra-ocular tension; they are in every way different from those caused by glaucoma in the adult or by buphthalmos in the child. The differences are so great that it is inconceivable that they could be due to the same cause. The supporters of these tension theories postulate two kinds of myopia—namely, a “school myopia” and an “hereditary myopia.” Levinsohn points out that such a distinction is impossible; school myopia may develop into pernicious myopia.

Levinsohn has made experiments upon cats to determine whether stimulation of the external ocular muscles raises the intra-ocular tension. He finds that ordinary contractions have no action, but intense spasm causes a transient rise in tension. In other words, no act of convergence can raise the tension within the eye. Donders and Monnik found no sign of tension, as measured with a tonometer, during accommodation or convergence. The author has repeated the experiment, using Schiötz's tonometer, with identical results. All these facts show that myopia is not caused by the action of the ocular musculature, and is not due to intra-ocular tension. It is, however, associated with close book work. How? What factor remains? The weight of the eyes when the head is bent down. In this position Levinsohn says the whole weight of the eyes is supported by the inelastic optic nerve, and it is only to be expected that the sclera will stretch. What arguments can be brought forward to support this theory? Levinsohn points out that Birch-Hirschfeld has shown that the eyes come forward 1.7 mm. when the head is kept bent through a right angle. He has by another method confirmed this result. In spite of this dependent position, all the experiments which have been made lead to the conclusion that there is no increase of intra-ocular tension. The whole effect is due to the weight of the eye. The extensibility of nerve tissue is very small, that of muscles great, too great, indeed, to enable the recti to take the weight of the eye. Nor is the bend in the optic nerve enough to let the eye proptose 1.7 mm. without tension upon its coats. There are no other structures which support the eye, which therefore hangs by the optic nerve, like an apple on its stalk, and gradually stretches. To prove his point, Levinsohn has hung very young rabbits, cats, and puppies, in bags, head downwards, for several hours a day, for periods extending up to ninety days. Twelve of these animals shewed an increased myopia or diminished hypermetropia, which varied from 1 dioptre to 4.5 dioptries. The refraction was determined by retinoscopy, which was carried out by five independent observers and until they all coincided, the figures were not accepted.

The author explains how the typical changes at the optic nerve are produced by this tension at the nerve head.

We accept at once the destructive criticism of the tension and muscle theories, which do not account for the facts, and therefore cannot be true. But we feel the same about Levinsohn's theory. There are several well-known facts regarding myopia which tell against all these mechanical explanations. The severe forms of myopia with complications are far more frequent among country folk than among the educated classes. A carman or a farm labourer does not bend his head for hours a day over books, and yet he gets severe progressive myopia with serious complications, which the moderately myopic bookworm escapes. It is far from uncommon to find high myopia in children of three or four years, who have never done any eye work at all. Again, high myopia up to 20 D. or more is frequently found confined to one eye, and yet both weigh the same and both have been equally hung on the nerve.

Myopia is not nearly so common in England as in Germany; nothing approaching to 50 per cent. of our medical men have myopia, as in Germany, and yet our medical students work long hours and have similar anatomical conformation to their Teutonic brethren.

The fact is, that myopia is due to an essential weakness of the posterior part of the sclera, which causes it to stretch under normal intra-ocular tension. The cause of this inherent vice is quite unknown. It may affect one eye alone. It is quite conceivable that any cause which makes the body flabby, will increase the undue distensibility of the sclera. Such a cause we have in German schools. There we have children, boys especially, mercilessly crammed to pass the difficult examination which enables them to serve one year in the army instead of two; no football, no open-air exercise, merely work and drill, then work and gymnasium. In Sweden *games* have been introduced, and the percentage of myopia among the students has fallen in a most astonishing manner.

We are not disposed to accept Levinsohn's experiments until they have been repeated and confirmed by an independent observer. We find retinoscopy upon human babies difficult enough; upon puppies it must be exasperating and highly inaccurate. We are surprised to see that the refraction of the normal unhung animals varied from $-2.5D.$ to $+3.5D.$, which is on *à priori* grounds improbable. These animals are constructed by nature to keep their heads down and we decline absolutely to believe that they get myopic by it. Even if we accept the fact that twelve animals out of an unknown number did get more myopic, it proves little, because the whole experiment is utterly unnatural. A number of the animals died during the process. Again, we do not for a moment believe that the eyes really hang on the optic nerves. The *tonus* of four muscles is quite enough to take their weight. The author views the orbit as a mere mechanical arrangement, and quite neglects the vital factor.

The book is beautifully printed on good paper, which has not a glossy surface. The German is easy. It is well worth reading, if only as a summary of the current theories of myopia.

T. HARRISON BUTLER.

E. Merck's Annual Report of recent advances in Pharmaceutical Chemistry and Therapeutics. Volume XXV. London: 16, Jewry Street, E.C.

Among the newer remedies employed in eye work noted in the 35th volume of Merck's *Annual Report*, the following may be mentioned:

Adonidin, a glucoside isolated from *Adonis vernalis* by Cervello, a brownish powder readily soluble in water and in alcohol, has been used as a 1 per cent. watery solution as a local anæsthetic in ophthalmology (A. Schidlowski). A couple of drops of a 2 per cent. solution produce complete anæsthesia within twenty-five minutes, which lasts for three to four hours. The irritation caused by it must be allowed to pass away before commencing an operation. It has been suggested in painful affections of the eye, such as acute glaucoma, iritis, and irido-cyclitis, as well as in diseases of the cornea. Reports upon the action of erythrophlœine as a local anæsthetic do not appear to indicate that the agent is likely to come into anything like general use. On the other hand, the glucoside Helleborein is stated by Venturini and Gasparini sometimes to produce results even better than cocaine itself. For operations $1/40$ to $1/32$ grain is said to render the cornea and conjunctiva of animals anæsthetic in thirty minutes, without causing any irritation. Almatein, a condensation product of hæmatoxylin and formaldehyde, has been employed

in catarrhal and phlyctenular conditions of the ocular conjunctiva. A weak lotion of titanium sulphate has been used by Pick in various affections of the eye, such as phlyctenular conjunctivitis. Syrgol has been employed successfully in blennorrhœa of the conjunctiva and in affections of the lacrymal sac (C. A. Hegner). Ferrosajodin is well spoken of in the treatment of scrofulous affections of the eye by Radziejewski, who gives $7\frac{1}{2}$ grains twice daily to children of from two to four years.

With regard to better-known remedies, it is interesting to note that Wolffberg, on the strength of a successful case, recommends the use of dionin combined with physostigmine in hæmorrhagic glaucoma, where it alleviates pain and allows the eserine to act upon the pupil. A 2 per cent. to 3 per cent. aqueous solution of resorcin is preferred by Knapp to resorcin ointment in cases of chronic conjunctivitis. The solution is said to keep better if made with boric lotion rather than with plain water. Marmorati expresses himself as satisfied with the picric acid treatment of burns and caustic injuries of the cornea, as recommended by Fortunati and others. Westhoff has a good word to say for the subcutaneous injection of iodipin in cases of irido-cyclitis, where Salvarsan or mercury had not succeeded. P. Knapp treats keratitis dendritica by first scraping the affected area, and then painting it with a solution of chlorine. By these means he obtained an unexpectedly rapid result in five cases. Harston's favourable experiences in the treatment of trachoma with the carbonic acid pencil are mentioned. In the treatment of *ulcus serpens corneæ*, W. Gilbert speaks favourably of the local use of concentrated tincture of iodine, prepared by evaporating ordinary tincture of iodine to one-third of its original volume. With this product, the edge of the ulcer is touched daily until it takes on an intense brown colour.

SYDNEY STEPHENSON.

CORRESPONDENCE.

[While THE OPHTHALMOSCOPE will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.]

MINERS' NYSTAGMUS.

To the Editor of THE OPHTHALMOSCOPE.

SIR,—Quite apart from the practical importance of the subject, the discussion of miners' nystagmus is very interesting from the point of view of the theory of vision. I have suggested that vision takes place through stimulation of the cones by the decomposition of the photo-chemical fluid surrounding them, sensitised by the visual purple. On this view, the rods are not percipient elements, and are only concerned with the visual purple. I have shown that the fovea is blind in certain circumstances. When there is no visual purple in the fovea, this is conveyed there either by stimulation of the surrounding portions of the retina by light or by movement of the eye.

If a chalk mark be made on a black board, in a feebly-lighted room, and be regarded intently, the eye will commence to move or the chalk mark will disappear if the eye be kept from moving. If several other chalk marks be placed at a short distance from the first one, not only will the eye be less inclined to move, but the centre chalk mark will be seen much more clearly. This shows the value of a diffuse light instead of a point source.

In three papers in the *Journal of Physiology* (Nov., 1910, July, 1911, and Aug., 1912), I have given a number of new visual phenomena, all obtained in the first place by deduction from the above theory. The fact, for instance, that an after-image can change its relative place in the field of vision is inconsistent with any other hypothesis.

London,
Dec. 4th, 1912.

Faithfully yours,
F. W. EDRIDGE-GREEN.

OPERATIONS FOR GLAUCOMA.

To the Editor of THE OPHTHALMOSCOPE.

SIR,

I have read with considerable surprise the review in THE OPHTHALMOSCOPE of October, 1912, by Mr. Bernard Cridland, of Professor Lagrange's address delivered before the French Society of Ophthalmology in 1912 and reported in the *Archives d'ophthalmologie*, in June, 1912.

Professor Lagrange appears to have two main complaints:—(1) that I, in common with a large number of English authors, have failed to give him the credit which is his due, and (2) that we are giving our names to modifications of his operation. In addition, he makes the claim that all methods of performing sclerectomy should be called by his name. I shall take these three matters in turn.

Be it first understood that, as I am unable to gain access to the original paper, I am obliged to accept Mr. Bernard Cridland's review as it stands. There seems, under the circumstances, to be no valid objection to this course. I answer Professor Lagrange because he has so prominently associated my name with his attack on English surgeons, and I shall do so on questions of facts.

(1) In my original communication in THE OPHTHALMOSCOPE of December, 1909, I fully acknowledged Professor Lagrange's work. I again acknowledged it in my more lengthy article in THE OPHTHALMOSCOPE of July, 1910, and in my paper read before the Oxford Congress on July 13th, 1911, printed in THE OPHTHALMOSCOPE of August, 1911. I once more repeated my acknowledgment in my article in *Ophthalmology*, of April, 1911. It would therefore appear that so far from being remiss I have been punctilious in the matter.

Nor am I the only British surgeon interested in glaucoma operations who has freely and generously acknowledged Professor Lagrange's work. I can name three others at least (and I have not made a single reference on the subject), every one of them leading men, who have done the same. I therefore think that Professor Lagrange has treated British surgeons with less generosity than they have shown to him. With regard to the particular article in THE OPHTHALMOSCOPE of May, 1912, in which Professor Lagrange states "Elliot there writes an article 'on his operation' without making any allusion to mine." I have read and re-read this article most carefully and I cannot find that I have once throughout it spoken of trephining as "my operation." It is a statistical and impersonal record of facts, and I do not think that any allusion to Professor Lagrange's work was therein called for, especially as I had so often acknowledged it before in the pages of the very journal this article appears in.

(2) I for one deny *in toto* that I gave my name to any operation. I was most careful not to do so until after Sir Henry Swanzy, Professor Fuchs, Dr. Temple Smith, and others, had already done so, and only then on one occasion

and in reply to a surgeon who deliberately raised the question after the issue of the latest edition of Professor Swanzy's book. I have no brief for other British surgeons, but I am sure that if they chose to do so, they would have little difficulty in justifying such of their actions as Professor Lagrange here attacks.

(3) I come to Professor Lagrange's claim. The facts are so well known that it is not worth while labouring the point, but I do not think that either in France or in England professional opinion would support him in demanding that all forms of sclerectomy shall be called by his name. Such a scheme would be unworkable, unnecessary, and unjust.

I should like to remind your readers of a fact which Professor Lagrange has apparently lost sight of, *viz.*, that the credit of realizing the value of the filtering cicatrix, belongs to no living man, but, if I mistake not, to his distinguished fellow countryman, de Wecker, and this, too, nearly fifty years ago. The central idea of all the modern operations is the production of the filtering cicatrix, and if the whole credit of all advance is to be given to one man, it surely should go to de Wecker.

Professor Lagrange criticises what he calls "all the modifications of his technique," and gives the credit to Holth alone. On what authority does he venture such opinions? I have performed his operation very often; has he ever tried trephining or the other methods which he includes in this sweeping condemnation? If not, his criticism is open to very severe criticism in its turn. His objection to trephining surprises me, and can very easily be answered, if necessary.

In conclusion, I would once again acknowledge the debt that ophthalmology owes to Professor Lagrange for advancing one step forward, the dream of von Graefe and of de Wecker, and I regret that I should have been obliged in self-defence to challenge the statements of one for whom I had hitherto nothing but admiration.

Yours truly,

SHAWFIELD, EGMORE, MADRAS,
— 1912.

R. H. ELLIOT, Lt.-Col., I.M.S.

NOTES AND ECHOES.

Appointments.

MR. P. W. MAXWELL has been appointed surgeon to the Royal Victoria Eye and Ear Hospital, Dublin, in room of the late Arthur H. Benson, and Mr. Louis

Werner has been appointed junior surgeon in place of Mr. Maxwell.

Mr. A. B. Cluckie, D.O.Oxon., has been appointed surgeon to the Bath Eye Hospital.

Ophthalmia Neonatorum.

IN the House of Commons on November 18th last Mr. Joseph Pointer (M.P. for the Attercliffe Division of Sheffield) asked the President of the Local Government Board whether he would state in how many districts he

had sanctioned the compulsory notification of ophthalmia of the newly born, and what was the population of the districts; whether he proposed to make the disease compulsorily notifiable throughout the country; whether, having regard to the number of infants whose sight was lost or impaired through neglect of the disease, he was taking steps, under the provisions of the National Insurance Act, to extend sanatorium benefit to the disease; if not,

whether he would consider the desirability of doing so; and whether it was proposed to make any Government grant to assist local authorities in making adequate provision for the treatment of the disease in the families of uninsured as well as of insured persons. Mr. Burns replied: I have sanctioned the compulsory notification ophthalmia of the newly born in 216 districts with a population of 11,497,277, and I am considering the question of extending the requirement of compulsory notification of this disease to the whole country. There is no present intention of extending sanatorium benefit to this disease under the National Insurance Act or of making a grant in respect of treatment.

* * * *

**Oxford
Ophthalmological
Congress.**

THE Congress will assemble at Keble College, Oxford, on Wednesday, July 16th next, and the meeting will be held on Thursday and Friday, July 17th and 18th. Any member who has cases or specimens to show, or is desirous of giving a demonstration or exhibition is requested to communicate with the Honorary Secretary at 33, Welbeck Street, London, W.

* * * *

**University of Colorado:
Course in
Ophthalmology.**

THE first Summer Course in Ophthalmology at the University of Colorado was completed in August last. The Course was unique in that seventeen ophthalmic surgeons took part in the teaching. Of these four, Drs. Casey A. Wood, of Chicago, Frank C. Todd, of Minneapolis, and T. B. Schneideman and L. Webster Fox, of Philadelphia, had each travelled more than one thousand miles to give their lectures and demonstrations.

In addition to the ophthalmologists, lectures on related subjects were given by seven physicians and surgeons engaged in other lines of work. These dealt with: the relation of the nasal accessory sinuses to the optic nerve and the orbit latent gonorrhœa as a cause of ocular disease; the Wassermann reaction and salvarsan; paralyzes of the ocular muscles, the optic tracts, and centers; blood pressure and its effects; and the localization of foreign bodies in the eye and orbit by the X-rays.

Ten students took the course. Of these, four, who had each had one or more years of clinical work in the ophthalmic hospitals, and had done the required reading and work in optics, entered for and passed the final examinations.

The examinations held on August 2nd and 3rd were clinical, written, and oral. The cases examined and reported upon clinically included: chronic plastic iritis, buphthalmos, phthisis bulbi, refractive errors, and nystagmus accompanying disease of the central nervous system. The oral examination dealt largely with the questions of therapeutics, and the examination and description of two microscopic sections.

The following questions were given for the written examination:

1. Name the varieties of regular astigmatism, and give the relations of the retina to the focal lines in each.
2. What bacteria are most commonly found in the conjunctiva (normal or inflamed); and what lesions are associated with their presence?
3. Describe glaucoma, its causes, pathologic anatomy, symptoms, prognosis, and treatment.
4. What are the signs of intraocular tumor, and the most common forms?
5. What muscular palsies cause vertical diplopia; and where will the false image appear in each case?

Each of the students will be required to submit a thesis which will be subjected to criticism. If satisfactorily and successfully defended, its writer will be eligible for the degree of Doctor of Ophthalmology at the next term.

* * * *

**Professional Incomes
in the
United States.**

FROM an editorial in a recent number of our contemporary, *The Ophthalmic Record* (Chicago), one gathers that in America there are now no ophthalmic surgeons whose professional income reaches 50,000 dollars (£10,000) per annum, while incomes up to 10,000 dollars (£2,000) are comparatively rare. The majority of so-called successful men earn but 5,000 dollars to 6,000 dollars (£1,000 to £1,200) a year, and "90 per cent. of the others do not receive even the emolument of such skilled artisans as carpenters or bricklayers." A decade ago this was not the case. The explanations of the shrinkage in professional incomes are the prevention of eye disease, the civic examination of school children, the competition of opticians, the over-production of specialists, and the better equipment of the general medical practitioner. It is further stated that the purchasing value of the dollar is only about one-half of what it was a generation since.

* * * *

**Signor Guglielmo
Marconi.**

SIGNOR MARCONI, whose eye was so seriously injured not long ago in a motor car accident by broken glass, has had the injured eye removed by Professor Fuchs, of Vienna, and Professor Bajardi, of Turin. The famous discoverer of wireless telegraphy has made a speedy and complete recovery from the operation.

* * * *

**XVII. International
Congress of Medicine,
London, August 6th to
12th, 1913.**

WE are asked by the Secretaries of the Section of Ophthalmology to remind our readers that, in accordance with the Rules of the Congress, it is necessary that *the titles* of all independent communications be sent, by their authors, not later than the 30th April, 1913, to The General Secretary, XVIIth International Congress of Medicine, 13, Hinde Street, London, W. Any papers offered after the 30th April, 1913, will only be placed upon the agenda after the discussion of those which have been announced before this date. No paper will be accepted unless the title has been received by the Secretaries of the Section of Ophthalmology (99, Harley Street, London, W.) before the 1st July, 1913. The text of every communication must be typewritten. Communications may be written in French, German, Italian or English.

* * * *

**An Irish Surgeon's
Bequest.**

MR. ROBERT JOHN MONTGOMERY, of Dublin, has left personal estate valued at £4,823. He has bequeathed £5,000 to the Board of Dublin University and to the Royal College of Surgeons, Ireland, for a "Mary Louisa Montgomery Lectureship" in ophthalmology, to be held alternately by the boards for a period of five years, the lectureship for the first five years after his death being held by Dublin University. The testator added that

should the income of his sisters, apart from that from real estate, amount to less than £200 per annum, then it shall be made up to that amount from the said fund.

* * * *

Dr. W. M. Sweet. At the meeting of the American Roentgen Ray Association, held at Niagara Falls on September 11th last, Dr. William M. Sweet was elected an honorary member of that Association in acknowledgment of his services in connection with the localisation of foreign bodies within the eyeball and orbit.

THE OPHTHALMOSCOPE DIARY.

1913.

Midland Ophthalmological Society.	Feby. 4th	Birmingham and Midland Eye Hospital.
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	Feby. 5th	1, Wimpole Street, London.
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	March 5th	1, Wimpole Street, London.
Midland Ophthalmological Society.	April 1st	Birmingham and Midland Eye Hospital.
Ophthalmological Society of the United Kingdom.	April 24th and 26th	London.
French Ophthalmological Society.	May 5th	Paris.
American Ophthalmological Society	May 6th	Washington, D.C.
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	May 7th	1, Wimpole Street, London.
Scottish Ophthalmological Club	May	
Midland Ophthalmological Society.	June 3rd	Shrewsbury.
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	June 4th	1, Wimpole Street, London.
Oxford Ophthalmological Congress.	July 16th to 18th	Keble College, Oxford.
Section of Ophthalmology, <i>British Medical Association.</i>	July	Brighton.
Ophthalmologische Gesellschaft.	August	Heidelberg.
Section of Ophthalmology, <i>XVIIth Int. Congress of Medicine.</i>	August 7th to 12th.	London
American Academy of Ophthalmology and Oto-Laryngology	November	Chattanooga, Tennessee, U.S.A.

THE OPHTHALMOSCOPE.

A MONTHLY REVIEW OF CURRENT OPHTHALMOLOGY.

VOL. XI.—No. 2.]

FEBRUARY 1, 1913.

[TWO SHILLINGS.

CONTENTS.

Original Communications.—

	PAGE
1. Bernard Cridland, D.O.—Gonorrhœal Infection in Eye Diseases	64
2. Lloyd B. Whitham, M.D.—Experiments on the Excretion of Salicylic Acid in the Ocular Humours	71

Memoranda.—

1. Edgar Stevenson, M.D.—Case of acute Glaucoma excited by Homatropin	73
2. N. Bishop Harman, M.B., F.R.C.S.—Partial Tenotomy of a Lateral Rectus to secure Vertical Deviation	74
3. Hanford McKee, B.A., M.D.—Meningococcus Conjunctivitis ...	75
4. George T. Mould.—Clinical notes on a case of Glaucoma covering a period of twenty years	76

Translations.—

1. On the Significance and the Method of Examining the Colour Sense. By Professor Stargardt and Fleet-Surgeon Oloff ...	79
2. Guide to the Microscopic Examination of the Eye (continued). By Professors Greeff, Stock, and Wintersteiner	92

Current Literature.—

I. The Eye Lesions of Insular Sclerosis	97
II. "Holes" at the Macula	103
III. The Field of Vision	105
IV. Tay-Sachs's Disease... ..	108
V. Sympathetic Affections	108
VI. Argyrosis	112
VII. Ocular Torticollis	113
VIII. Cerebral Decompression	114
IX. Magdalena Ophthalmia	117
X. Circulatory Phenomena	118
XI. Parinaud's Conjunctivitis	120
Book Notices	122
Notes and Echoes	130
The Ophthalmoscope Diary... ..	134

ORIGINAL COMMUNICATIONS.

GONORRHOËAL INFECTION IN EYE DISEASES.*

BY

BERNARD CRIDLAND, D.O.OXON., F.R.C.S.E.,

WOLVERHAMPTON, ENGLAND.

INFECTION of the eye by the gonococcus or by gonorrhœal virus takes place either directly, by the transference of the infecting organism to the conjunctiva, or indirectly, as a part of a systemic or general infection.

The way in which direct infection occurs is common knowledge, and it is unnecessary to go further into this beyond recalling a few points in connection with gonorrhœal conjunctivitis which are of interest, as follows.—First, it is to be borne in mind that not all cases present the typical acute attack so well known; mild cases, undoubtedly due to gonococci, have been recorded. Secondly, in both babies and adults the disease is frequently unilateral, although no special precaution has been taken to protect the second eye from infection; indeed, one author, Inouye,¹ states that in adults the unilateral type is the more common. From these facts it may be assumed that there is a variability in the virulence of the gonococcus itself, in the reaction of the conjunctiva to the gonococcus, and that a certain amount of susceptibility and immunity of the individual can exist in the case of this as of other micro-organisms.

With regard to the reaction of the conjunctiva to the gonococcus, there seems to be some curious relationship between trachoma and gonorrhœal infection.

Some few years ago it was demonstrated that the gonococcus could lie latent and innocuous on a conjunctiva already infected with trachoma.

In Egypt and Palestine ophthalmia neonatorum is rare, and trachoma abounds. It appears from T. Harrison Butler's² reports that a systemic gonorrhœal infection is practically never seen in Palestine.

Side by side with these facts are the recent and interesting findings of Heymann,³ of Breslau. In examining a series of cases, to see if the Prowazek-bodies or chlamydozoa found in trachoma were peculiar to that disease, this author has recorded that of nine cases in which the bodies were present, four were instances of gonorrhœal ophthalmia, the remaining five being active trachoma. Others, on the publication of these results, at once set to work to satisfy themselves on this point. Prowazek bodies were found in the genuine gonorrhœal cases, although only in a few, and in many conditions due to other causes. It is interesting also to note that Halberstaedter,⁴ although failing to find them in the majority of the babies suffering from gonorrhœal ophthalmia, did so in the genital tract of the mothers. These observations are noteworthy, and the future may show that they have some bearing on the relationship between trachoma and gonorrhœal infection, although the finding of the trachoma bodies is by no means confined to gonorrhœal conjunctivitis, for they have been found in even greater proportion in cases due to other causes, and also in the normal conjunctiva.

It has been thought by some observers that a gonorrhœal infection of the conjunctiva may produce or be followed by trachoma. Interesting cases by

* A Lecture delivered in the Course for the Diploma in Ophthalmology to the University of Oxford.

good authorities have been brought forward to demonstrate this. It is, however, by no means proved that a gonorrhœal ætiology of trachoma exists, and the general consensus of opinion is rather that these cases, in which gonococci were found at the same time as or just before trachoma was noted to be present, were examples of a mixed infection, although it is not unreasonable to consider that a gonorrhœal conjunctivitis may prepare the soil for trachoma. On the other hand, we find the evidence from the East suggests that trachoma ruins the soil for the gonococcus.

These facts may show that there is some relationship between gonorrhœal infection and trachoma.

Before passing to the more complicated subject of systemic gonorrhœal infection, one point with regard to the ulceration of the cornea that may occur in gonorrhœal conjunctivitis, deserves mention. It is generally considered that the ulceration is due to a mixed infection rather than to the gonococcus itself, and there does not appear to be any direct proof that this organism can cause the condition, although it is stated by good authorities that the gonococci can cause a suppurative destruction of the cornea and even find their way into the iris. It would be difficult not to find the organisms present in corneal ulceration occurring in the course of a gonorrhœal conjunctivitis, and their being found in that situation is hardly a proof that they are the direct causal agent. What probably happens in all cases is, that the altered condition of the anterior epithelium renders it more liable to become abraded even with the slightest injury, whilst the excellent chance that such an injury may occur is easily seen when one considers the frequent bathing and wiping of the eye, or the likelihood it runs of being rubbed by the patient. An abrasion once incurred, infection by other organisms takes place.

In ocular affections as the result or part of a systemic gonorrhœal infection, we have to deal with a difficult although interesting subject.

Since 1722, when St. Yves⁵ taught that certain ocular affections might occur in the course of a specific urethritis, cases in increasing numbers have been recorded which place beyond any doubt the fact that most of the structures of the eye, and also its appendage, the lacrymal gland, may participate in a general infection by the gonococcus and its toxin.

Ullmann,⁶ with the French, calls the condition, "gonorrhœismus," for he says, "it applies first to a chronic infection with gonococci, but also to a chronic intoxication with gonotoxins, and just as well in general to a special predisposition for such conditions. A combination of these ætiological factors is what we probably have to deal with." In a general way this expresses the pathology of the condition.

That a gonotoxin exists is beyond doubt, and there is also evidence that a gonotoxin by itself can cause a conjunctivitis.

Gonococci, however, have been found in the secretion of a number of cases of metastatic conjunctivitis in late stages, although not yet, I believe, in the deeper structures of the eye. The fact also that gonococci have been frequently grown in pure cultures from the blood, and have been found in lesions in nearly every part of the body, makes it more than likely that the organism itself is responsible for the ocular lesions. The existence and probable action of the toxin, however, cannot be disregarded. Gordon Byers,⁷ whose work on the subject is probably the best we have, surmises as follows:—"The gonococci are probably carried as emboli to the minute vessels of the eye, and through their growth and production of toxins excite the cellular proliferation," and again, "To explain the cases in which relapses occur, say in the iris, repeatedly and long after the organisms have ceased to enter the system from the inflamed urethra, one must conjecture that the gonococci

become encapsulated and dormant, as they often do in cases of urethritis, and break into fresh activity as the result of conditions which we do not at all understand."

There are three theories concerning the nature of the infection:—first, the one just put forward; secondly, that the gonococci prepare the soil for a mixed infection, *e.g.*, with staphylococci, streptococci, or pneumococci; and, lastly, the purely toxic theory.

In the light of the most recent cases which have been worked out bacteriologically in the fullest manner, the first theory as to the actual presence of the gonococci in the tissues gives the most likely explanation, especially if a local toxic action be admitted.

The number of cases of gonorrhœal ocular metastases recorded amounts at the present time to about two hundred, and some general clinical points can be evolved from their study.

A urethritis is usually the primary source of the infection, but not always so, for there are cases where a gonorrhœal conjunctivitis, in both adults and babies, was followed by a systemic infection.

The cases in which the posterior portion of the urethra and its surrounding structures have been attacked are the ones more likely to be followed by a systemic infection.

There seems to be no particular time in the course of the initial inflammation when a systemic infection may occur; it may be at the height of an acute urethritis or later in a more chronic stage.

In a number of cases the urethritis ceases when evidence of a systemic infection takes place, the "retropulsion" of the older writers. In a case recently recorded by Hanford McKee⁸ this point was well brought out, a urethral discharge of three or four months' standing in a young man suddenly ceasing with the onset of the eye symptoms.

It does not seem necessary for an arthritis or other lesion attributable to gonorrhœal metastases to precede the ocular one: the eye may be the first to be attacked and the only organ involved. Ricord, as long ago as 1835-53, held this view.

Lastly, there seems to be no indication as to what part or parts of the eye are likely to suffer. It might be expected, however, that if a particular structure of the globe had already been the seat of an inflammation from another cause, the stress of the gonorrhœal metastases would fall on that structure rather than on any other.

A tendency to recurrence is to a certain extent a feature of the disease.

Dealing now in detail with the different manifestations of this infection, we find that there is scarcely a single structure in the globe that may not become the seat of the metastatic inflammation.

The conjunctiva, cornea, sclera, uveal tract, nerves and retina, capsule of Tenon, and lacrymal gland have all been attacked. The uveal tract and the conjunctiva, however, are the two most commonly affected.

Metastatic conjunctivitis.

The characteristic features of metastatic conjunctivitis may be described as follows:—

A mild inflammation, mostly affecting the bulbar conjunctiva. The discharge, commonly mucoid, is scanty or may be absent. There may be chemosis, or swelling of the lids, but there is no papillary hypertrophy as may follow the inflammation in the direct infection. It is frequently the initial symptom, and sometimes the only manifestation, of systemic gonorrhœa, of which it is

generally an early sign. As might be expected, it is most common in males between 20 and 30 years of age. It is very rarely unilateral (there are three cases only to date), and, as a rule, both eyes are affected simultaneously.

Byers⁷ tells us that the clinical picture in metastatic conjunctivitis differs little, if at all, from that of any catarrhal inflammation of the conjunctiva. It may, however, be very acute, for in Hanford McKee's⁸ case (well worked out and admirably reported) the statement is made that: "The whole furnished a typical picture of a severe acute catarrhal conjunctivitis of pneumococcus or Koch-Weeks' type."

Kurka⁹, again, considers that "deep episcleral injection is a characteristic feature," for he found it in a number of his patients. Morax¹⁰ also described three similar cases. Byers⁷ thinks, however, that these form a sub-class by themselves, and he is probably right, although at the time of his statement he felt that it was perhaps too early to be definite on this point. But in 1909, Heerfordt¹¹ published a number of cases, of which the abstract in the *Ophthalmic Year Book*, under the heading of "Episcleritis," is as follows:— "As subconjunctivitis epibulbaris gonorrhoeica Heerfordt describes a metastatic gonorrhoeal infection observed by him twenty-three times in five years at Copenhagen. The disease shows a tendency to be localised in the episclera, and epibulbar subconjunctival mucosa. He has seen no case in which the retrotarsal fold was affected, such as are described by Saemisch and Groenouw as complicating urethritis. Neither has he found anywhere described the condition as he himself has observed it."

"It bears a close resemblance to phlyctenular conjunctivitis. The presence of a urethritis and joint disease and the absence of a history of similar attacks would serve to differentiate the two affections. There is usually a muco-purulent secretion, which is more profuse when the inflammation is superficial. The lids are sometimes swollen. In every case he examined the discharge for the gonococcus, but with negative results. He thinks that the disease is caused by the presence of remnants of dead gonococci or by toxins.

"In seventeen of the twenty-three cases there was some joint affection present."

"Corneal vesicles were a frequent complication. Iritis may also be present."

These cases, then, seem to be an episcleral form rather than conjunctival.

To resume, conjunctivitis appears to run its course as a pure conjunctivitis in 65 per cent. of cases, whilst in 35 per cent. complications are found, the most common of which is a superficial vesicular keratitis of a type similar to that not infrequently found in simple catarrhal inflammations of the membrane due to other causes. Iritis comes next.

The average duration of the inflammation is about two weeks, although the variations run from five to forty-six days.

Before leaving the conjunctiva, it is necessary to refer to two cases described by Kipp¹² in which phlyctenules were noted, and to recall the fact that Heerfordt stated that his cases bore a close resemblance to phlyctenular conjunctivitis; also in some cases recorded by Vigier¹³ in 1908, two showed conjunctival abscesses in the bulbar conjunctiva: no gonococci were found.

Corneal affections.

Metastatic keratitis is almost always recorded as a complication of conjunctivitis, but it may also occur in the course of metastatic iritis. It is of the superficial vesicular type, and tends to get well without any resultant leucoma. An actual ulceration of the cornea has been but once described, and that was by Jonathan Hutchinson¹⁴ in 1873; in that case severe ulceration

with loss of the eye took place. It is, however, reasonable to regard this as having been caused by a mixed infection.

Axenfeld¹⁵ states that it is impossible for any pus-producing organism to settle in the cornea in a place away from the margin and there set up an isolated abscess. Byers in his work quotes this opinion, and goes on to say, "This reasoning, while sound, does not however necessarily bar the possibility of gonorrhœal metastases. The gonococcus gains entrance into the general circulation by the attacking leucocytes, and with the death of the white cells in distant parts of the body, the organisms are set free to produce local changes. As then the leucocytes are free to enter the lymph spaces of the cornea, gonorrhœal metastases of this structure cannot be regarded as an impossibility." At the time of Byer's statement no gonococci had been demonstrated in the cornea. Posey,¹⁶ however, recorded an interesting case in 1909, in which six or eight vesicles developed on an old corneal macula, and were found to contain the gonococcus. No arthritis was present, and there was no result with antigonococcic vaccine. This, of course, is only one case, and one in which the gonorrhœal keratitis occurred in an eye already the subject of a former keratitis, presumably due to a different cause; nevertheless, gonococci were found, and it may reasonably be expected that the organisms will be found in other cases in course of time.

Up to the end of 1907, Byers had obtained records of twenty-eight cases of corneal complications, some doubtfully due to gonorrhœal metastasis. There have since been added others by Heerfordt, Posey, van Lint¹⁷ and van Chint,¹⁸ and an atypical one by Asher¹⁹ in which there was deep yellowish infiltration in each cornea, which subsequently cleared but left vision impaired.

The keratitis is usually, as before mentioned, vesicular and superficial; it is multiple, and tends to clear without permanent opacity; it appears that it may with equal frequency be symmetrical or asymmetrical, central or peripheral.

Scleral affections.

Affections of the sclera do not seem to be at all common, if we except Heerfordt's cases--which, however, are more examples of episcleritis than of scleritis. The few cases of scleritis or sclero-conjunctivitis, as Byers terms them, are regarded by him as evidence of an extension of inflammation to the interior structures of the globe.

Affections of the uveal tract.

In dealing with the affections of the uveal tract we are considering the structure of the globe which has received more attention in ocular gonorrhœal metastases than any other. There are more cases of iritis recorded as due to this cause than of conjunctivitis, the real, or perhaps equally common, inflammation. It may be that they are more frequent, but, on the other hand, they are more likely to be recognised and therefore to be recorded.

In the past four or five years a good deal has been said on the ætiology of iritis, and a number of cases, which once would have been regarded as "rheumatic" or of unknown origin, have been considered to be due to gonorrhœal metastasis. This is probably correct, but at the same time it would be well, perhaps, to guard against too extreme a view, and to say that while iritis of systemic gonorrhœal origin is more frequent than has hitherto been supposed, it is nevertheless a comparatively rare cause of the condition. Statistics from various authors, and from various countries and districts, differ considerably--namely, from nearly 0 per cent. to 15 per cent. of all cases of iritis. It must, then, be assumed that gonorrhœa, and therefore gonorrhœal metastatic iritis, is much more frequent in some communities than in others.

On pathological grounds, it is better to speak of the condition as irido-cyclitis rather than iritis, even in the mildest cases, for there is evidence to show that the ciliary body is usually considerably affected, even in cases where the stress appears to fall on the iris alone, and that in only a mild degree. I have been unable to find, so far, any case recorded where gonococci have been demonstrated in the uveal tract. The difficulties attendant on bacteriological examination are, however, so great that it is not right to conclude that they are absent, or to hold the negative findings as a support to the toxic theory. It is reasonable to consider that the gonococci are brought to the uveal tract, lodge there, and multiply; and that by their presence and local formation of toxins they produce changes in the structure. As with the conjunctival inflammation, irido-cyclitis occurs by far most frequently in males and between the ages of 20 and 30, the age of the greatest sexual activity. It is more often uni- than bilateral, and there is a tendency to recurrence. When such takes place, however, the first attacks are more often bilateral than the later ones in the same case. It may be the first symptom of a systemic infection but usually is in association with or follows after an arthritis. It may occur by itself, and also years after the original gonorrhœal infection, as pointed out by J. Griffith²⁰ in 1900.

As to the types of uveal inflammation, Byers differentiates the following.—Mild, severe, or plastic irido-cyclitis, exudative iritis, hæmorrhagic iritis, recurrent and relapsing iritis, suppurative irido-choroiditis, and, lastly, those occurring in association with other conditions, namely, conjunctivitis, keratitis, retinitis and neuro-retinitis, and dacryoadenitis.

There appears to be little that is characteristic about this form of irido-cyclitis, and the above classification (excluding the last item) is merely one of degree, as may occur in irido-cyclitis from other causes.

Some writers have regarded the presence of much exudate in the anterior chamber as being a feature in the disease; it may be suggestive, but it is by no means characteristic. It would rather seem that one has to deal with an inflammation of the uveal tract in which the stress falls on the iris and ciliary body, rarely on the choroid as well, and that perhaps bilaterality in the cases in which it occurs, together with a tendency to recovery, are suggestive in making the diagnosis when compared with like cases from other causes.

Affections of the Nerve and Retina.

With regard to inflammation of the nerve and retina due to this infection, thirteen cases have been collected by Byers up to 1907, and to these another can be added, recently reported by Sir Wm. Gowers²¹ although it is not exactly in the same category as the thirteen. The thirteen are all examples of neuritis and neuro-retinitis, whilst Gowers' case is one of double retro-bulbar neuritis associated with myelitis.

The neuritis and neuro-retinitis cases form an interesting group in connection with this infection, although the ophthalmoscopic picture is that of a neuro-retinitis, without any special character.

Byers regards them as telling in favour of a local toxic action inseparably connected with the presence of the organism in the affected tissues. Gowers' case, by analogy to the condition when due to other causes, would suggest a more general toxæmia. In his case the neuritis began about two months after an attack of gonorrhœa. Paraplegia with anæsthesia and retention of urine followed two months later, and were complete in a week. Treatment by antigonococcic serum failed, although some improvement might, in the author's opinion, have been obtained had it been employed earlier.

Miscellaneous Affections.

One case of Tenonitis is on record by Peuch²² in 1895. The history is chiefly responsible for the diagnosis, but is sufficiently clear to make it more than probable that the condition was due to gonorrhœal metastasis.

Lastly, with regard to affections of the lacrymal gland, seventeen cases of dacryoadenitis have been collected from literature by Byers; but in five only is the evidence strongly in favour of a gonorrhœal metastatic origin. No case has been recorded since 1908. The appearances described are what might be expected in an acute inflammatory condition of the lacrymal glands, and in varying degree nearly all the cases were bilateral.

Treatment.

In conclusion, a word or two on treatment may not be out of place.

The various conditions demand the local treatment suitable to the situation of the inflammation. In the direct infection a gonococcal vaccine may be made from the micro-organisms present in the conjunctival sac, but inasmuch as gonorrhœal conjunctivitis is a disease which tends to get well of itself, all that can be expected of such treatment is that it may cut short the duration of the inflammation. Vaccine might be of service when ulceration of the cornea is present as a complication, but as it is not proved that this is actually due to the gonococcus, the administration of a gonococcal vaccine could hardly be adopted on other than empirical grounds. A mixed vaccine might possibly be of service.

It is otherwise in the systemic infection, and we may confidently look to obtaining the most brilliant results from the use of a vaccine, and to a certain extent the cases already reported bear this out. On the question of vaccine therapy in general, a statement by Horder²³ is of interest, as follows.—“My opinion is that vaccine therapy is an effective method in combating an important factor—it may be *the* most important factor—in the struggle between the tissues and many infecting agents. I believe, however, that there are other factors in this struggle which are not touched by the use of vaccines, and that this natural limitation does exist, though at present it is quite undefined.”

The above is applicable to the vaccine treatment in this infection and suggests that too much must not be expected by these means.

With regard to the cases reported to date, four out of the fifty-three by Eyre and Stewart²⁴ showed eye affections—namely, iritis. In all, within a few days, improvement was effected, and complete cure obtained in from one to two and a half months. Shumway's²⁵ case agreed with these; for in his case, also one of iritis, relief of symptoms was obtained in two days and cure in five weeks. Rubbrecht²⁶ claims an excellent result in a systemic conjunctivitis and keratitis, and so on with others. From a general perusal, it may be gathered that an early improvement is obtained, and a complete cure hastened.

Regarding the vaccine itself, an autogenic one is best, although not easy to obtain. A stock of vaccine, comprising as many as a dozen different strains, may be, is almost as good, provided it be fresh. The general opinion in England is that small doses are best, although in America large ones are used. The doses can be repeated weekly, according to the reaction. It is well to remember that gonococcal vaccine is toxic, and that due caution should be exercised in its administration.

A gonococcic vaccine was produced in 1910 by Schering representing an aqueous emulsion of killed gonococci and called “Arthigon.” It has been used

with success in general cases which have resisted other treatment, but not, I believe, in eye cases.

Finally, Deutschmann²⁷ has recorded a successful case with his yeast-serum.

REFERENCES.

1. Inouye.—Axenfeld's "Bacteriology of the Eye," p. 228.
2. Butler, T. Harrison.—*Royal London Ophthalmic Hospital Reports*, 1907, Vol. XVII, p. 115.
3. Heymann.—*Deutsch. med. Wochenschrift*, 1907, Nr. 39.
4. Halberstaedter.—*THE OPHTHALMOSCOPE*, Vol. IX, p. 4.
5. St. Yves.—*Mackenzie's Diseases of the Eye*, 4th Ed., p. 471.
6. Ullmann.—*Amer. Journ. Ophth.*, Vol. XXIV, pp. 139, 185, 201.
7. Byers, Gordon.—"Gonorrhœal Ocular Metastases," 1908.
8. McKee, Hanford.—*THE OPHTHALMOSCOPE*, Vol. VII, p. 462.
9. Kurka.—*Wiener klin. Woch.*, Bd. XV, SS. 1032-1035.
10. Morax.—*Thèse de Paris*, 1894, pp. 69-75.
11. Heerfordt.—von Graefe's *Archiv f. Ophth.*, Bd. LXXII, Heft ii, Oktober 26, 1909.
12. Kipp.—*Medical Record*, Vol. XVII, pp. 717-719.
13. Vigier.—*Archiv. d'Ophthalmologie*, 1908, p. 513.
14. Hutchinson, Jonathan.—*Royal London Ophthalmic Hospital Reports*, Vols. VII and VIII.
15. Axenfeld.—"Bacteriology of the Eye."
16. Posey.—*Ophthalmic Record*, May, 1909.
17. van Lint
18. van Chint }—Abstract in *Ophthalmic Year Book*, 1910.
19. Asher
20. Griffith, John.—*Trans. Ophth. Soc. U.K.*, Vol. XX, pp. 83-92.
21. Gowers, Sir Wm.—*Medical Annual*, 1911.
22. Peuch.—*La Clinique Ophthalmologique*, T. I, pp. 8-9.
23. Horder.—*Practitioner*, September, 1910.
24. Eyre and Stewart.—*Lancet*, July 10, 1909.
25. Shumway, E. A.—*Coll. of Phys. of Philadelphia*, Sect. of Ophth., Jan. 20, 1910.
26. Rubbrecht.—Abstract in *Medical Annual*, 1911.
27. Deutschmann.—*THE OPHTHALMOSCOPE*, December, 1908.

EXPERIMENTS ON THE EXCRETION OF SALICYLIC ACID IN THE OCULAR HUMOURS.

BY

LLOYD B. WHITHAM, M.D.,

OF BALTIMORE, Ma., U.S.A.

GIFFORD¹ has written enthusiastically of the treatment of sympathetic ophthalmia with massive doses of salicylate of soda, aspirin, or other salicylic acid compounds, and has reported so many recoveries from its employment that the most conservative and sceptical must admit its possible value in the early stages of that obstinate disease. Nor does Gifford stand alone with his splendid results. His work has been corroborated by Welton,² Bane,³ Campbell,⁴ de Schweinitz,⁵ Wood,⁶ Webster,⁷ Baker,⁸ Heuse,⁹ Lindahl,¹⁰ Widmark¹¹, and Lees.¹² Some of the complete recoveries of very severe cases, which are recorded, seem almost miraculous. Gifford gives thirty grains in two drachms of brandy five times a day, while Morton¹³ gives forty grains in cold water, on an empty stomach, every four hours until relief is obtained.

Admitted that the drug exerts a highly beneficial action in sympathetic ophthalmitis, the question naturally follows: How does it accomplish this? There have been numerous surmises. Gifford's is, perhaps, the most plausible. He attributes the effect of the drug to a depletion of the inflamed tissues by means of the general capillary distention which it occasions. As the excretion of hexamethylenamine ("urotropine") and other drugs in the eye has been successfully demonstrated¹⁴, it occurred to the writer that the excretion of

salicylic acid in the aqueous might go some way towards explaining its therapeutic action. Therefore, he has conducted some simple qualitative experiments on rabbits, using several of the salicylates, with the following results:—

1. Salicylic acid excreted in very weak solution four hours after ingestion of phenylsalicylate, following paracentesis of the cornea.

2. Salicylic acid excreted in very weak solution six hours after ingestion of acetylparamidophenol salicylic following paracentesis of the cornea.

3. Salicylic acid excreted quite markedly four hours after the ingestion of hexamethylenamine-salicylate (formaldehyde was also excreted).

4. The strength of this excreted salicylic acid was slightly increased after hot applications to the cornea, more so after paracentesis of the same, greatly after instillation of 10 per cent. dionin solution, and markedly after subconjunctival injection of physiological salt solution. (These experiments were purely qualitative and were judged by the depth of colour in the end reaction,¹⁵ each rabbit having been fed on the same amount of the saturated solution. The test¹⁵ used is a very delicate one, capable of detecting 1/10 m.g. of salicylic acid in the litre.)

5. The pneumococcus, so important a factor in traumatic uveitis,¹⁶ is notably influenced in its growth, *viz*: into a culture tube, inoculated from a serum-agar culture of pneumococcus, was placed the aqueous of a rabbit fed upon hexamethylenamine salicylate and the tube was put into the incubator. After thirty-six hours, the growth, being examined, was found rather well advanced above the level of the gravitated aqueous, but was very scanty on that part of the medium which was immersed in the aqueous. This would seem to denote an inhibitive action on bacterial growth; or, perhaps, a direct, although mild, antiseptic power.*

From the foregoing experiments it appears that hexamethylenamine-salicylate will give better clinical results than any of the salicylic acid compounds, because it is extremely soluble (and thus rapidly enters the circulation), lacks the danger of phenol poisoning (often met with in continued use of phenyl salicylate),¹⁷ and fails to produce the gastric discomfort and marked tinnitus of sodium salicylate¹⁷ or the cardiac depression of acetylsalicylic acid.¹⁷ If the drug be prescribed in a freshly prepared saturated solution, a most rapid action will be obtained.

Now to pass to the therapeutic application of these experiments to sympathetic ophthalmia.—A solution of salicylic acid will enter Fontana's spaces, Schlemm's canal, the sclera, the supra-choroidal space, the tissue of the iris, the capsule of the lens, and the endothelium of the cornea,¹⁸ although the flow in normal eyes is not constant.¹⁹ As the aqueous is a filtration product of the vessels of the iris and ciliary processes, and not a secretion product of the ciliary cells,²⁰ it follows that the more blood called to the eye, the greater will be the amount of salicylic acid solution in the humour, and hence more in inflammation, causing, as it does, a swelling and engorgement of the tissues. This assertion is borne out by A. Burk,²¹ who tells us that the metabolism in an inflamed eye takes place much more rapidly than in a healthy one, and that in many pathological cases the iris takes part in the production of aqueous, which means that more salicylic acid solution circulates through the iris, as well as the ciliary body, during inflammation.

Granted, then, that the amount of salicylic acid solution is increased in the inflamed eye, let us review other ways in which such an increase is obtained.

*Moreover, Goldbach, in some interesting and unreported experiments, has shown that the salicylate of soda is excreted as salicylic acid throughout the entire uveal tract, although he has not yet completed his quantitative tests with the colorimetric findings.

Friebis's²² case demonstrated clinically that dionin increased the effectiveness of the salicylic acid treatment, while Hertel,²³ contends that after a subconjunctival injection of salt solution, there is a rise in the osmotic concentration of the aqueous. Most conclusive still are the deductions of Wessely²⁴: the composition of the aqueous, newly secreted after puncture, is affected by the hyperæmia of the intra-ocular vessels, hence by inflammatory engorgement or irritative medication.

This naturally leads us to the efficacy of salicylic acid in the treatment of sympathetic ophthalmitis, but here the subject becomes one not to be settled so much by experimental work as by long and careful clinical observation. Certainly, salicylic acid seems to yield more excellent results, in the early stage of the disease, than any other drug so far used. But, of all forms of treatment recommended at the present day, the most logical and the one from which most is to be expected, is the serum treatment recently advocated, and so brilliantly carried out in a few instances, by Derby and Pratt.²⁵

LITERATURE.

1. Gifford, H.—(a) *Transactions Ophth. Sect. A. M. A.*, 1899. (b) Reported in *Journal of A. M. A.*, 1900. (c) *Ophthalmic Record*, 1902. (d) *THE OPHTHALMOSCOPE*, April, 1910.
2. Welton.—*Archives of Ophthalmology*, 1911, p. 379.
3. Bane.—*Ibid.*, 1900, p. 451.
4. Campbell, D. M.—(a) *Ophthalmic Record*, 1908, p. 581. (b) *Ibid.*, November, 1908.
5. de Schweinitz, G. E.—“Diseases of the Eye.”
6. Wood.—“System of Ophthalmological Therapeutics,” 1909.
7. Webster.—*Ophthalmic Record*, 1909, p. 521.
8. Baker.—*Ibid.*, p. 522.
9. Heuse.—*Centralblatt f. prak. Augenheilk.*, April, 1901.
10. Lindahl.—*THE OPHTHALMOSCOPE*, 1905, p. 195.
11. Widmark.—*Mittheilung aus der Augenklinik, etc., zu Stockholm*, Heft ix, S. 114.
12. Lees.—Abstract in *Journal A. M. A.*, 1909, p. 594.
13. Morton.—Weeks' “Diseases of the Eye.”
14. Gradle, H.—*Ophthalmic Record*, 1911.
15. Witham, L.—*Archives of Ophthalmology*, November, 1911.
16. Harrington and Richardson.—“Practical Hygiene,” p. 240.
17. Gilbert.—“Meeting of Soc. Morph. and Physiol., Munich,” November 16, 1904.
18. Potter.—“Materia Med,” “Pharm. and Therapeutics.”
19. Rochat, G. F.—*Nederl. Tydschrift voor Geneeskunde*, 1911, i, No. 11.
20. Weiss, O.—*Ibid.*, p. 1
21. Carlini, V.—von Graefe's *Archiv für Ophth.*, Bd. LXXVII, S. 1.
22. Burk, A.—*Klin. Monatsbl. f. Augenheilkunde*, Bd. VIII, Heft ii, Teil 4, S. 445.
23. Friebis, G.—*Ophthalmic Record*, April, 1910.
24. Hertel.—*Klin. Monatsbl. f. Augenheilk.*, Bd. XLVIII, Engänz. S. 75.
25. Wessely, K.—*Zeitschrift f. Augenheilkunde*, Bd. XXV, Heft iv, S. 315.
25. Derby and Pratt.—*Am. Ophth. Soc.*, New London, July, 1911.

CLINICAL MEMORANDA.

CASE OF ACUTE GLAUCOMA EXCITED BY HOMATROPIN.

BY

EDGAR STEVENSON, M.D.,
LIVERPOOL, ENGLAND.

J. B., aged 23 years, an engineer, came on Friday, September 13th, complaining of “foreign body,” a chip of steel, in his left cornea. The particle was easily removed, but as the eye was rather irritable, I washed out the conjunctival sac, and instilled a couple of drops of homatropin solution, 4 grains to the ounce.

On Monday, the 16th, he came with the following story :

His eye had remained comfortable till late on Saturday, when it began to be painful. On Sunday and early Monday he was in very great pain with the eye, could not hold his head up, and felt sick.

I saw him early on the Monday morning, and found that he had a typical attack of acute glaucoma, his vision in that eye being reduced to counting fingers with difficulty.

I immediately put in some eserine, and after three instillations at intervals of about a quarter of an hour, the pupil was contracted and the tension became normal.

On the following day, he had recovered completely, and his vision was as follows :—

R. $6/24 + 4 \bigcirc 1$ cyl. ax. $120^\circ = 6/9$ ptly.

L. $6/12 + 4 \bigcirc 0.5$ cyl. ax. $90^\circ = 6/9$ ptly.

The optic nerves showed deep physiological cups, and in the left eye some opaque nerve fibres. There was nothing pathological in either eye. The anterior chamber in both eyes was very shallow, and the corneæ appeared slightly smaller than normal, although I did not measure them.

Remarks.

A glaucomatous attack after one instillation of homatropin in a young adult must be very rare. My colleague, Mr. C. H. B. Shears, reported a somewhat similar case in the *Transactions* of the Ophthalmological Society in 1900, but his patient was aged 54 years.

I think it is extremely probable that my patient will, in early middle life, develop glaucoma as a natural sequence to his unfortunate and marked predisposition to the disease.

PARTIAL TENOTOMY OF A LATERAL RECTUS TO SECURE VERTICAL DEVIATION.

BY

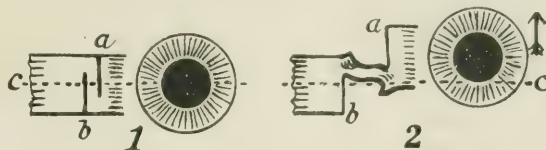
N. BISHOP HARMAN, M.B., F.R.C.S.

LONDON, ENGLAND.

IN a few cases of convergent squint there is evidence of a co-existing vertical deviation of the eyes, and in a few others a vertical deviation remains after a more or less complete reduction of the excessive convergence. In this note, some experiments will be described that were done with a view to ascertaining whether a partial tenotomy of one of the lateral recti tendons could be so arranged as to secure a vertical deviation of the eyes with some degree of lengthening of the tendon operated upon. The experiments were made originally upon narrow strips of rubber strapping, but the findings have since been verified upon the living subject.

The tendon to be operated upon is exposed by a vertical button-hole across the axis of the tendon passing through conjunctiva and Tenon's capsule. The tendon is brought into view with a squint hook. Two cuts are then made across the tendon from opposite edges of the tendon; each cut should sever two-thirds the width of the tendon. The cuts can be made with scissors, whilst the tendon is held upon the squint hook; or the tendon can be held with the "director-forceps" already described on page 24 of the last number of THE OPHTHALMOSCOPE, when the cuts can be made with greater precision.

According to the position of the cut nearest the insertion of the tendon into the eye, so the eye will turn upwards or downwards. If this near cut be made from the *upper edge* of the tendon, the eye will turn *upwards*; if it be made from the *lower edge* the eye will turn *down*.



Partial tenotomy of a lateral rectus so as to secure lengthening of that tendon, together with *vertical deviation* of the eye. 1 Lines of incisions; 2 effect of incisions. *a* upper cut nearest insertion with deviation upwards; *c*.....*c* original axis of tendon.
(The drawings are made from the effects produced by the cuts upon a strip of strapping.)

The figures show the effect of such a pair of cuts upon a piece of strapping. The cut nearest the "insertion" is from the upper edge, so the effect of the two cuts is to allow the "globe" to turn up. The amount of lengthening produced by these sections in the one case operated upon was small, but the relatively considerable vertical deviation of fully five degrees was obtained.

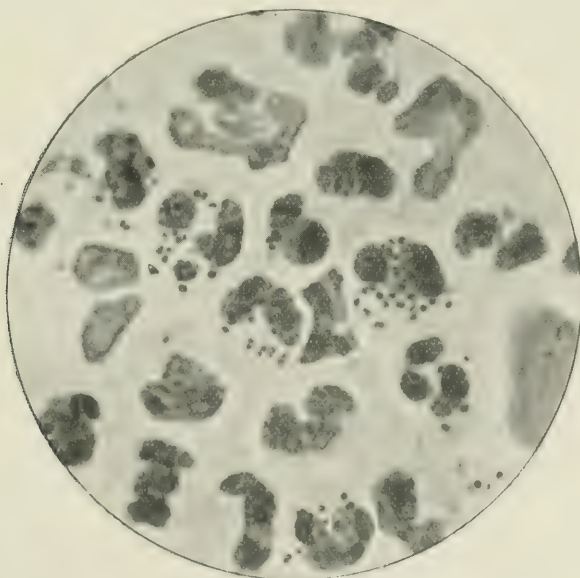
MENINGOCOCCUS CONJUNCTIVITIS.*

BY

HANFORD MCKEE, B.A., M.D.,

MONTREAL, CANADA.

UPON two former occasions the writer has reported cases of conjunctivitis caused by the *diplococcus intracellularis meningitidis*, and since then has watched cases of epidemic meningitis for inflammation of the conjunctiva.



Some time ago, a little girl, A.D., aged six years, was brought to the Montreal General Hospital on the fourth day of her illness, with supposed epidemic

*From the Pathological Laboratory of the Montreal General Hospital.

meningitis. She had a marked conjunctivitis in each eye, with considerable muco-purulent discharge. Smears were prepared, and stained by Gram's method. Large numbers of Gram-negative diplococci were found, lying free and in the leucocytes. Suitable media, consisting of hæmoglobin agar, ascitic agar, blood serum, and plain agar, were inoculated and twenty-four hours later examined. The hæmoglobin and ascitic agar gave pure cultures of a Gram-negative diplococcus. In the culture on blood serum there were found diplococci similar to the bacillus xerosis, while in the plain agar tube there was no growth. This diplococcus in pure culture was compared with the meningococcus, gonococcus, and the micrococcus catarrhalis. It grew well on blood serum, but only at incubation temperature. It grew slightly on plain agar—not as well as the micrococcus but better than the gonococcus. It was viable for only forty-eight hours, and films prepared after twenty-four showed many degenerated forms.

In the sugar reactions and macroscopic agglutination test the diplococcus from the conjunctiva reacted the same as the organism obtained from the cerebro-spinal fluid. The accompanying microphotograph was made from a prepared film and shows numerous meningococci of 2,000 diameters magnification.

Conjunctivitis, as is well known, is frequently seen in cases of epidemic meningitis, and in the majority of cases it is an early symptom, so that it is often possible, as in this case, to give a fairly accurate diagnosis of meningococcus conjunctivitis before the organism has been obtained from the cerebro-spinal fluid.

CLINICAL NOTES ON A CASE OF GLAUCOMA COVERING A PERIOD OF TWENTY YEARS.

BY

GEORGE T. MOULD,
LONDON, ENGLAND.

E. L.—dressmaker, aged 29 years, was admitted into the Royal London Ophthalmic Hospital, on November 23rd, 1892, for subacute glaucoma, with the following history.—The patient was ordered glasses (+ 1 D. sph., R. and L.) here in 1888. Had halos in right eye at times, for seven or eight years, and in left also, for two or three months, and more frequently during this summer. Has had “fogs” for about one year, in the evening; last spring first noticed “fogs” during the daytime.

Present condition.

Pain, at times very severe, with nausea frequently, and actual vomiting occasionally. When the “fog” is worse the pain is worse. Right eye always worse than left. During the previous August cupping of discs had been noted. T. ? Eserine drops (gr. $\frac{1}{2}$) were ordered for use three times a day. The drops kept symptoms down. Has been using drops (gr. $\frac{1}{8}$) up to yesterday (November 22nd, 1892).

No injection of eyes. Cornea normal. Anterior chamber shallow.

Right pupil 4 mm., active, slightly irregular, updrawn at one spot. Deep cupping of disc. V. = 6/24 c. + 1 sph. = 6/18₍₂₎. T. + 2; field contracted. Left pupil circular, 3.5 mm., active. Slight cupping of disc. V. = 6/24. T. + 2; field contracted.

Progress and Treatment.

On November 24th, 1892, iridectomy was performed on the right eye, under cocaine, and a good coloboma was obtained above.

November 25th, 1892.—R.E., T. low; pupil dilated; good anterior chamber; eye quiet.

November 27th, 1892.—T. — 1. Eye quiet.

November 29th, 1892.—Complains of left eye. T. + 2; no injection. Right eye doing well.

December 1st, 1892.—Iridectomy was performed, under cocaine, upon the left eye. It was noted that ? periphery of iris was left all along coloboma.

December 4th, 1892.—Left eye: T. low—quiet.

December 6th, 1892.—R.E., T. +; L.E., T. low: both eyes painful. The patient was ordered dark glasses yesterday. L.E. slight injection to inner side; anterior chamber shallow.

$$\begin{array}{rcl} \text{R.V.} & = & \frac{6}{24} (2) + 2.5 \text{ D. cyl. hor.} = \frac{6}{18} (3) \\ \text{December 8th, 1892.} & & \\ & & - 0.75 \text{ D. sph.} \\ \text{L.V.} & = & \frac{6}{60} + 2.5 \text{ D. cyl. hor.} = \frac{6}{12} \text{ nearly.} \end{array}$$

T. full in right eye, but soft in left. Still slight injection to inner side of left eye. Patient discharged.

Course.

The patient appears to have gone on remarkably well, presumably under eserine continuously, for the next note that can be traced was made on January 18th, 1894, when vision = 6/6 with glasses, but it is not stated what the glasses were. Eserine drops (gr. $\frac{1}{2}$). On April 19th, 1894, she was ordered eserine as before, and hot boric lotion, but no further note made, so that the condition could scarcely have been serious.

She continued under eserin, and on August 1st, 1895, the following neutral tinted glasses were ordered.—R. + $\frac{1}{2}$ D. sph. L. + $\frac{1}{2}$ D. sph.
+ 2.5 D. cyl. 12° + 1.5 D. cyl. 12°

On November 28th, 1895, R. T. + 1; L. T. + was noted.

She continued attending regularly, and in April, 1896, she was ordered eserin and cocaine drops, with an aperient mixture and pills. She continued under this treatment, and in August, 1897, it was noted that tension was normal. In October, 1897, she complained of occasional severe pain; there was, however, no relapse, and she continued in a satisfactory condition; but was kept continuously under treatment. The next note of her condition is one made on December 17th, 1903. It was as follows: deep cupping R. and L. optic disc, no pulsation seen. Eye quiet, no increased tension, occasional pain of severe character and eye gets bloodshot. (It is not stated which eye, possibly both are meant). Eserine continued.

July 28th, 1904.—L.E., T. n. R.E.T., slightly > L.

September 22nd, 1904.—T. n. in both right and left eye. Complains of a "gritty" feeling in right eye.

April 24th, 1905.—L., T. n. R., T. a little higher; headache.

November 6th, 1905.—R.E., T. n. L.E., T. + (note change).

In April, 1906, the patient was again ordered aperient mixture, and advised to see a dentist; eserine (gr. $\frac{1}{2}$) was continued.

By August, 1906, tension was normal in each eye. Her condition continued to be satisfactory, although tension went up a little occasionally, but was always controlled by eserine.

In November 19th, 1909, vision was R.E.=6/9 and L.E.=6/6 partly. She continued to attend Hospital regularly every two months, the eyes keeping in a satisfactory condition, but on December 22nd, 1910, the tension of the right eye rose to +2, there having been a sudden relapse without obvious cause.

She was taken into Hospital, and on January 1st, 1911, Herbert's sclerotomy was performed (under cocaine) on the right eye. Two days later, the tension had fallen to +1. On January 16th, 1911, paracentesis was performed on the right eye under cocaine. The eye not doing very well, the sclerotomy was repeated three days later (January 19th, 1911).

The left eye now showing symptoms of relapse, Herbert's sclerotomy was performed on it also on January 26th, 1911 (cocaine).

February 1st, 1911.—R.E., Tension full. L.E., T. +1.

February 2nd, 1911.—Sclerotomy was repeated on the left eye.

February 17th, 1911.—The following note was made.—Cornea bright; discs cupped; good filtration from right sclerotomy wound; little obvious filtration from left.

R.E., T. low	V.	+1 sph.	6
		+2.5 cyl. 12°	12'
L.E., T. normal.	V.	+1 sph.	6
		+1.5 cyl. 12°	9'

Patient discharged from Hospital. Since then she has kept perfectly well; has attended Hospital regularly as before, continuing local treatment by eserine (gr. $\frac{1}{2}$) twice a day,

March 4th, 1912.—Patient complained that her eyes felt "different" since the last operations, but she has no real trouble with them.

August 15th, 1912.—The refraction was worked out again, and there appeared to be rather less astigmatism in the right eye and more in the left eye than is represented by her old glasses, but as she sees quite well and is comfortable with the old ones, no alteration was made.

The last note of her condition, made on December 4th, 1912, was as follows.—Keeping very well. Under eserine (gr. $\frac{1}{2}$). Very good filtration each eye. Considerable œdema can be produced by testing with a blunt probe. Anterior chambers rather shallow. Very clean colobomata (results of original operations). Sites of late sclerotomies well-marked, but not cystoid in appearance, although filtration is so good. Corneæ clear and bright. Discs cupped. Vision keeps up to R.E. nearly 6/12, and L.E. nearly 6/9, with correction.

Remarks.

This case is, I think, worthy of record, and forms a good companion to the one reported by me in THE OPHTHALMOSCOPE of May, 1912 (p. 252). The notes of the first case covered a period of 37 years, and of this one, 20 years. In the former a single iridectomy proved effectual in the case of the right eye, which has remained perfectly well, with good vision, in spite of a threatened relapse about eight years ago. The left eye, however, which had an iridectomy, followed by sclerotomy, never did well, and has little or no vision now.

In this last case, a single iridectomy proved effectual in each eye for eighteen years, when a sudden relapse occurred, necessitating sclerotomy, which was repeated after a few days on both eyes. The eyes have kept quite well since then, two years ago, with normal tension and good vision.

I am indebted to Mr. Claude A. Worth for permission to publish the notes of the foregoing case.

TRANSLATIONS.

ON THE SIGNIFICANCE AND THE METHOD OF
EXAMINING THE COLOUR SENSE.

BY

Professor STARGARDT and Fleet-Surgeon OLOFF.

OF KIEL, GERMANY.

Zeitschrift für Augenheilkunde, Juli, 1912.

THERE is a widely spread opinion that the whole question of colour vision testing in the army, the naval services, and on the railways, was settled, finally and absolutely, when Nagel's test was adopted.

We are quite unable to share this opinion. On the contrary, long continued and, for the most part, mutual experience in the field of colour vision testing has convinced us that, although Nagel's plates are greatly superior to the earlier tests, and especially to Holmgren's wools, they yet leave much to be desired and in practice are not always sufficient. There is a general agreement that some form of colour sense test is necessary and important for seamen and for railway servants.

There are, however, still many medical men who take up the position that the significance of defects in colour sense has from a practical standpoint been exaggerated. Concerning these opinions, we wish here to insist upon the fact that there can be no question whatever of exaggeration.

It is not only upon theoretical grounds that we have come to call for an exact examination of colour sense, but because unfortunate practical experience has conclusively shown its necessity.

As so often happens in life, a serious accident served to focus public attention on the subject. It is well known that in the year 1875 the Swedish physiologist, Holmgren, gained indisputable evidence that the railway accident at Lagerlunda, in Sweden, in which nine passengers were killed, was caused by the colour blindness of the engine driver. In the same year a collision took place off the Norfolk coast between the steamers "Lumbermann" and "Isaac Bell," caused by the captain mistaking a green light for red, and altering his course accordingly. It was conclusively proved that the captain was colour blind.

The foundering of the steamer "City of Austria," in Fernandia* harbour, was due to the fact that the pilot could not distinguish between the different colours on the buoys. The following accidents, narrated by Prinz in the *Marineverordnungsblatt* for 1886, were also the result of colour blindness.—In February, 1877, the Spanish gunboat, entering the roads of Batabano, rammed the schooner "Teneriffe," because the captain of the schooner mistook the gunboat's side light for a white leading harbour light. Similarly, the schooner "Teresa" was lost in 1879 because she confused the red harbour light standing on the quay at Gibora† with a white light on a building on the quay. More recently, there have been many accidents which must be ascribed to the colour blindness of the responsible person. We need only recall the collision on the lower Elbe between the steamers "Primus" and "Hansa," when 107 persons were drowned.

The state of affairs is exactly the same on land. Colour blindness was found to be the cause of the railway accident at Oberkotzau, in Bavaria. There are also, as Nagel insists, many cases which have been

* The authors doubtless mean Fernandina in Florida.—EDITOR.

† Doubtless Jibara in Cuba is meant.—EDITOR.

hushed up in which an accident was averted only at the last moment, because a normal-sighted individual took the charge of affairs out of the hands of the colour-blind or colour-weak responsible person.

In foreign literature, which in recent years has devoted much attention to this subject, it has been rightly pointed out that a subsequent enquiry must often be barren of results, because frequently the engine driver or ship's captain loses his life in the accident. It is therefore quite possible that in a list of accidents by land and water which have not been officially explained, defects of colour vision have played a part. As we make certain stipulations regarding the colour sense of persons who on the railway or at sea have to recognise coloured signals, it is absolutely necessary that the colour tests should be carried out in the most careful manner. This is not only necessary to prevent accidents, but also to shield the examinee from blame later on.

We have constantly found that individuals who have been frequently examined and found to possess normal colour sense, when more carefully examined, have been shown to be colour blind or colour weak, and in consequence their future career has been seriously compromised.

Professional seamen who have acted for years in the Merchant Service, and in it have undergone many colour sense examinations—in most cases, too, who have passed their pilot's examination and so obtained a sure livelihood—are often discovered to be colour blind when they come up for training in the Navy. In consequence, they are unable to serve their time at sea as would naturally have otherwise been the case, but have had to join the Army. But now their colour-blindness has been recorded permanently, and they are unable even to return to the Merchant Service. Their whole professional training has been wasted, and they have to seek, late in life, another profession. We have come across similar cases in the railway service. Here, again, we have had to examine persons who have held responsible situations and have been passed as colour sound, but have turned out to be colour blind. Again, the discovery of colour blindness necessitated a fall in the social scale. On these grounds we cannot sufficiently insist that examination of the colour sense is a very responsible part of a doctor's work.

In consequence of the great importance of colour-sense examination for certain branches of the Army, but especially for the railway and Naval services, it is absolutely essential that we should discover the sources of error in our methods, with a view to adopting procedures which reduce these sources to a minimum.

The Holmgren wool test and Adler's coloured crayons must be rejected at once.

The Holmgren wool test consists, as is well known, in laying out before the candidate a large number of variously coloured skeins of wool and allowing him to match them according to a recognised rule. Nagel was the first to point out that the Holmgren test is *absolutely unreliable*, and that *it allows a large percentage of colour blind persons to slip through the examination*. In 1905 Collin showed that among 1778 non-commissioned officers and men of the railway brigade who had been constantly tested with Holmgren's wools and had been passed as normal, 13 were colour blind (dichromatics) and 31 were colour weak (abnormal trichromatics). Further examinations made by us in the Navy, both on board and on land, confirmed these results, and led to the use of Nagel's test to the exclusion of Holmgren's.

The Adler test depends upon the same principle as the wool test. The candidate is asked to select from a large number of crayons all the blues, greens, and so on. These choices are utilized to mark a paper with, and so a permanent record is obtained. The Adler test has all the faults of the

wool test. We have had no good results from it, if we exclude crass examples of well-developed colour blindness. All the colour weak individuals (abnormal trichromatics) whom we examined passed the test without exception, and the majority of the colour blind had no difficulty with it (dichromatics). Whereas the Holmgren and Adler tests are rough empirical methods, modern colour sense tests are based upon the results of decades of careful study of the colour sense and its abnormalities.

Before we enter closely into these methods, we must in a few words explain modern opinions upon colour vision and its abnormalities. Grounding our views upon our present knowledge, we divide mankind into trichromatics, dichromatics, and achromatics, a classification based upon the Young-Helmholtz theory of colour vision. Young and Helmholtz ascribe the manifold coloured impressions which normal man receives to the stimulation of three different parts or structures in the eye, or, as we now express it, following the suggestion of von Kries, three different "components" are excited, whether it be three substances, three types of end-organ, or something else, which is concerned in the act. Of these three components the first is said to be excited by light of long wave length, the second by light of medium wave length, and the third by light of short wave length. The stimulation of the first component gives the sensation of red, the second of green, and the third of violet, and so we have to speak of the red, green, and violet components. Simultaneous action of two or three components gives rise to the sensation of all the various colour impressions. If an individual possesses all three components, he has a trichromatic colour system, he is a "trichromatic." If all three components function normally, he is a "normal trichromatic." If one component be more or less defective, or only partially present, he is an "abnormal trichromatic," and according to which component is defective, he is abnormal for red, green, or violet. If a person possesses only two components, we call him a "dichromatic," and we distinguish the "protanopes," in whom the red component is wanting, from the "deutanopes," who have no green components, and from the "tritanopes, in whom the violet component fails. Although it would be better always to talk of protanopes, deutanopes, and tritanopes, to avoid false conclusions and confusion, these terms have not received general recognition, and even to-day we frequently talk of red blindness, green blindness, and violet blindness. If, finally, a person has only one component, he is totally colour blind; he can only distinguish light and shade, and has an achromatic colour system. (The authors here add a foot-note to the effect that they avoid discussion of the Hering theory of colour sensation, because modern methods of colour sense testing are based upon the Young-Helmholtz theory.—T. H. B.)

We can at once exclude total colour blindness from this category, because it is excessively rare (among 40,000 individuals at most one total achromatic will be found), and also because this condition is associated with high-grade amblyopia, with nystagmus and photophobia, and so as regards service in the Army, Railway, or Navy, it does not enter into the question at all.

We can also exclude the tritanopes from among the dichromatics, because they are so exceedingly rare. We have, so far, detected no case of this anomaly either in the railway service or the Navy. Among the trichromatics the violet anomaly falls into a similar category.

We have therefore only to consider the cases in which there is a defective perception of green and red. These include, among dichromatics the protanopes (red blind), and the deutanopes (green blind), and among the anomalous trichromatics, the red and green varieties.

These anomalies are very important, because in all of them there is a

defective appreciation or an entire absence of the sensation of red and green, and these two sensations must be normal in order to appreciate correctly the usual signals on the railway and at sea.

Practically, then, the examination of the colour sense reduces itself to the detection of these four defects. If we wish to understand the methods adopted to unmask these errors, we must clearly comprehend how persons affected with such anomalies really see.

An essential difference is present between the anomalous red and green types, on the one side, and the protanopes and deuteranopes, on the other. Let us commence with the protanopes and deuteranopes. As we have already stated, the red component is absent from the protanopes, the green component from the deuteranopes. One would naturally think that the protanope would merely not see red, but see green, violet, and their admixture exactly as a normal, and that the deuteranope would merely fail to appreciate green, but would receive red and violet normally. Such is, however, not the case, and we must absolutely disabuse our minds of this hypothesis if we wish to understand the defects of colour appreciation among protanopes and deuteranopes.

Protanopes and deuteranopes possess two components. They have, therefore, the power of perceiving two colours. These are not green and violet, or red and violet, as the case may be, but they are *two colour tones*, which we can best express as a "*warm*" *yellowish* and a "*cold*" *blueish*.

On these two points, both protanopes and deuteranopes behave exactly the same. Both see the world in two colours and their mixtures, and these two colours are the same for each. If a normal eye studies the spectrum, it sees not only the well-known series: red, orange, yellow, green, blue, violet, but it can appreciate a long list of transition steps, in all, about 160 colour tones.

If a protanope or a deuteranope looks at the spectrum, one half of it, the long wave length (red side) rays awake a warm tone, the other half with short wave length rays (violet side) causes the sensation of a cold tone.

The region of the warm and cold tones are separated by a "neutral zone," which, to both protanopes and deuteranopes, appears absolutely colourless, and which occupies a situation about where the normal individual sees blue-green.

It follows from this that all the varied colours which the normal individual sees as red, orange, yellow, and green, appear to the protanope and the deuteranope as a single colour, the "warm tone." The different parts of the spectrum in the "warm tone" region differ only in one particular, that is in brightness. The brightness varies in different parts of the "warm tone." In protanopes the maximal brightness is found near wave length, $570\ \mu\mu$, that is to say, at a spot where the normal sees green-yellow. The deuteranope has his maximal brightness near wave length, $600\ \mu\mu$, that is in the spot which is orange to the normal eye.

The brightness in the "warm tone" diminishes on each side of the position of maximal brilliancy. It follows from this fact that every spot on one side of the maximal brilliancy must correspond to a position on the opposite side, which appears equally bright to both protanopes and deuteranopes.

For example, a spot which appears red to the normal must appear exactly as bright to the protanope as a spot on the opposite side of the maximal brilliancy which the normal sees as green. The protanope, and analogously the deuteranope, must confuse certain colours on the ordinary spectrum with the "warm tone," which to the normal are absolutely different. He confuses them because they are not only in the same "warm tone," but also of the

same brilliancy. This confusion, however, goes much further if we alter the brightness in different parts of the spectrum. *It is possible, by appropriate alteration, to get confusion between every part of the "warm tone."* This alteration of the brilliancy of selected portions of the spectrum is extensively used to-day in the diagnosis of protanopy and deuteranopy; we employ it, too, in the differential diagnosis between the two forms of dichromatopsy.

Up to the present we have seen that protanopes and deuteranopes behave similarly as regards colour vision. So far, we have discovered only one essential difference between the two, namely, the different position of the point of maximal brilliancy.

There is, however, a difference between the two, which is of the highest importance. Whereas in protanopes the red component is wanting, he is unable to see the long wave length rays (red end). The spectrum appears to him to be "shortened" at the red end. We can explain the fact that the whole of the long wave length end of the spectrum which we see red is not absent, by the theory that long wave length rays stimulate the green and violet components slightly, which components are present in protanopes. If one of these components be alone excited, we get the sensation of a cold or warm tone. If, however, both be excited, they annul each other, and we only get a colourless sensation, because they are complementary to each other.

For these reasons, when the eye of a protanope receives certain long waved rays, he only appreciates the sensation of a dim, colourless tone. Analogously, the deuteranope in whom the green component fails, should see the green part of the spectrum black. This is not the case. He sees a weak colourless light, because light of medium wave length reacts upon both red and violet components, and the two tones elicited from these two components annul each other.

Another phenomenon is apparent, intimately associated with this shortening of the spectrum in protanopes and with the appearance of a colourless band in the green in deuteranopes, namely, that the part of the spectrum within the warm tones which appears darkest to the protanopes corresponds to our red, and that which appears darkest to the deuteranopes corresponds to our green. These are exactly the places which bound the colourless areas of the protanope and deuteranope.

This fact, then, that a different spot within the "warm tone" appears darker to the protanope than to the deuteranope, is used, as we shall see below, for the purpose of differential diagnosis.

We have seen above that the differences in the spectrum as seen by protanopes and deuteranopes lie in the fact that the point of maximal brilliancy in the "warm tone" lies at a different spot, and that the protanope has a shortened red end, the deuteranope a broader neutral belt in the green, and, finally, that the darkest part of the warm tone is placed in a different spot by each.

We see that this is a very trivial difference. And this trivial distinction with reference to the spectrum corresponds to their behaviour with pigments, with which we are chiefly concerned in practical life. Protanopes and deuteranopes behave in practical life almost in the same manner. Generally speaking, the protanope sees red objects much darker than the deuteranope. Colour mixtures containing red appear different to him from what they do to the deuteranope. Thus, the protanope sees certain rose colours containing blue as a blue cold colour tone, whereas the deuteranope sees rose as colourless, because the red and blue neutralise each other.

We see that even in practical life there are only minimal differences between protanopes and deuteranopes. We might, therefore, generally content

ourselves with the diagnosis of a dichromatic colour system. Practically, it makes no difference whether a man is a protanope or a deuteranope. If in spite of everything, a more exact diagnosis is wanted, it must be regarded as a concession to ancient hypotheses. In days gone by it was held to be essential to distinguish between the red blind and the green blind. In those times the nature of colour blindness was imperfectly known. Whereas unfortunately protanopia has been identified with the red blindness and deuteranopia with the green blindness of past history, so even to-day some think that it is a practical necessity to separate the two.

It would be a great advantage if we could agree that such a distinction is absolutely immaterial from a practical standpoint, and that we could finally content ourselves with deciding that an individual was a dichromatic or partially colour blind.

In considering the red and green anomalies, the only class of trichromatics which concern us, we are dealing with individuals who theoretically possess three components, but one component is more or less defective. Whereas the degree of this defect may vary exceedingly, it is clear that we shall find all grades of colour weakness among these anomalous trichromatics, ranging from almost normal vision to complete dichromatopsia.

On the one hand, we have abnormal trichromics who vary from the normal only in a minimal degree, and on the other, we find persons who are almost dichromic. There is, therefore, not a green and a red anomaly, but a whole series of different stages, which behave very differently from each other. It is therefore impossible to give any concise account of the vision of abnormal trichromics. One sees almost exactly like a normal person; the other can hardly be distinguished from a dichromic.

Only the severe cases of trichromatism possess, as is already known, a number of peculiarities, the practical significance of which must not be underestimated. Exact research, for example, has shown that they require more time to recognise a colour than a normal individual; that they must see it under a wider visual angle; and that the colour must be more saturated and intense before they can be as sure of it as a normal eye is. In consequence of this, when a trichromatic sees a pale yellow near a red he calls it green, a pale yellow near a green, a red. Finally, we must recognise that the abnormal trichromatic becomes fatigued with extraordinary ease. We often notice this during examination. Many of them have observed this for themselves, and find this characteristic very troublesome and unpleasant. Many of our patients have spontaneously complained of this.

We may now consider the *methods of examination* which we possess at the present time. On the one hand, we have tests which depend upon spectral light, and on the other, those which employ pigmentary colours.

It would be better if we could eliminate pigment tests entirely, and use only the natural colours of the spectrum which we obtain by the prismatic dispersion of white light in the spectroscope. This is impossible in practice, because a trustworthy instrument, such as Helmholtz's, is very expensive, quite apart from the fact that special knowledge of the physiology of colour perception is necessary for its use. Nagel's simplified spectral apparatus, the "Anomaloscope," costs over £15, and is therefore still too dear for general use, but it is necessary in the diagnosis of doubtful cases. It is essential that certain central stations should be furnished with this apparatus. The Kiel Marine Hospital has one, and all doubtful cases which cannot be quite cleared up with pigment tests, are examined at this institution. Every railway centre ought to have an Anomaloscope, to render certain and satisfactory diagnosis possible.

The Anomaloscope serves, as the name suggests, not only to unmask colour blindness (dichromatism), but also to detect anomalous trichomatism. The Anomaloscope consists essentially of a telescope, in which the examinee sees a small circular field. This field is divided into two by a horizontal line. The lower half obtains its light from a prism which is so adjusted that only yellow (sodium line) light illuminates it. Behind the prism is a slit which can be narrowed as much as is desired. This is done by a screw, which we shall call, for convenience, the "yellow screw." If the scale attached to the screw stands at zero, the field is quite dark, 88 indicates its maximal brilliancy. It is therefore possible by turning the yellow screw to vary the brightness of the lower field between the widest limits. The colour, however (sodium yellow), remains constantly the same.

The upper half of the circular field is simultaneously lighted by two prisms, one of which is adjusted to furnish green light (thallium green), the other red light (lithium red). In this case, also, slits are placed behind the prisms which can be adjusted at will either fully opened or quite shut. But it is only possible to alter the two slots simultaneously, and their motions are complementary in the sense that as one opens the other shuts in an equal degree.

In this way it is possible to modify the light mixture as we wish. We can present any mixture of red or green or entirely shut out either colour. The slits are actuated by a screw, which we shall for shortness call the "red-green screw." The milled head of the screw is graduated from 0 to 88. If the pointer stands at 0 we have a field which is illuminated by pure spectral green, if we turn it red is introduced. The more red we add, the more colourless the green, until at a certain spot (58 on the scale) the upper half of the field becomes a colourless yellow, neither green nor red. As we continue to turn the screw, the upper field takes on a red tone, which becomes more marked, until ultimately all the green is shut out and the field is a pure spectral red.

We have just seen that at a certain position of the red-green screw (that is to say, with a definite mixture of red and green) the upper field becomes to a normal eye colourless with a yellowish tone. It is now possible to modify the intensity of the lower field by turning the yellow screw until both fields have the same intensity. In other words, we can make a match between a yellow light of a certain brilliancy and a mixture of pure spectral red and green. This is the well-known *Rayleigh Equation*. This match is made for a normal individual when the yellow screw indicates 14, the red green 58. To discover with the Anomaloscope whether anyone has a normal trichromatic colour system it is only necessary to fix the yellow screw at 14, and ask the examinee to make the match by turning the red-green screw. If he places it at 58 he has a normal colour perception. But this limit is not mathematically exact. We more often find slight variations, which may extend from one to two marks on the scale of the Anomaloscope or even 3 or 4 on one side or the other of 58, without in any way showing colour weakness. Such small variations must be regarded as lying within the physiological limits of normal colour perception. The fact that a normal person who matches at 58 sees a distinct green or red when he turns 3-4 divisions to the right or left does not alter this view at all. Nor is the fact of importance that those who make a match at 54 or 62 when they look at a match made by a normal eye see the upper field decidedly red or green; that is, in other words, they reject the match made by the normal eye.

It is an important question, especially as regards practice, where we have to adjudicate between normal and abnormal trichromatics. Our experience is that there is no such hard and fast line.

But for practical work we require a definite limit. This must be empirically found and determined. We suggest that on an Anomaloscope whose equation figures for the normal eye are 14 and 15, the limits should be 54 on the green side, and 64 on the red side. Everything, within these limits is to be regarded as normal; Köllner has laid the limits down at 56 and 64. We, however, consider that it is safe to go up to 54 on the green side. The behaviour of candidates with the pigment tests weighed with us in fixing these limits. All the examinees who match between these limits were able to read Stilling's tablets easily, and made no mistake with Nagel's test. They were only a little uncertain between green and grey. But this is, in our opinion, of no importance. The confusion of green and grey is so common that Nagel himself has explained that the mistake was only of decisive importance when the examinee did not recognise his mistake when his attention had been drawn to it. Our experience that anomalous trichromatics generally chose values which were widely outside the limits chosen above was of value to us. Thus, abnormal reds generally placed the index at 70; abnormal greens below 45. Here, again, we agree with Köllner.

In the case of such well-marked anomalous trichromatics, what we have stated above about easy fatigue must not be overlooked.

The Anomaloscope is also of value for the diagnosis of *protanopia* and *deutanopia*. To examine these anomalies, we place a pure red in the upper field of the instrument. Both protanope and deutanope see this in the warm tone we have spoken of already. Both of them can by turning the yellow screw adjust the lower field of the Anomaloscope until it matches the upper. Thus, both protanope and deutanope will make "a match between red and yellow." It is easy by the position of the yellow screw to discover whether we are dealing with protanopia or deutanopia. Here spectral red appears a dark warm colour to the protanope, he therefore places a very dark yellow in the field (yellow screw under 10). The deutanope sees red as a much brighter colour tone, so he puts more yellow in to make the match (yellow screw over 20). Quite analogously the protanope and deutanope can match pure spectral green with yellow. The fact that such a match is possible is sure evidence of the presence of dichromatism. But even in the adjustment of a green-yellow match there are differences between protanopia and deutanopia. As we have already seen, a protanope must choose a brighter yellow to match a pure spectral green than a deutanope. At the Anomaloscope the protanope places the yellow screw at 60 or more (a bright yellow), the deutanope adjusts it to 40 or less (a darker yellow). If therefore a match can be made in the Anomaloscope between red and yellow and between green and yellow, protanopia or deutanopia is present. The distinction between the two lies in the brilliancy of the yellow chosen. We must note that "extremely abnormal trichromatics," those who approach dichromatics, make the same adjustments as protanopes and deutanopes, and so it may happen that even with the Anomaloscope the differential diagnosis between abnormal trichromatism and dichromatism may be exceedingly difficult; generally the distinction is made easier by the fact that abnormal trichromatics can make a red-yellow, but not a green-yellow match. Should, however, a very abnormal trichromatic be mistaken for a dichromatic, it makes no practical difference. We possess in the Anomaloscope an apparatus which gives us extraordinarily exact information, and that quantitative regarding the anomaly with which we have to deal. Certain precautions are advisable in using the instrument. It is possible that dichromatics and extreme anomalous trichromatics may make the Rayleigh match either correctly or nearly so. This point demands the closest attention. For if we examine

by the Rayleigh equation alone we shall overlook a large number of these anomalies. We can shield ourselves from such mistakes if we always first examine with Nagel's or Stilling's plates, and if we always begin the examination by the Anomaloscope with the search for dichromacy.

It may also happen, as Köllner has pointed out, that many abnormal trichomatics cannot make a match between the yellow which corresponds to 14 and a mixture of red and green. In such cases the brilliancy of the yellow must be simultaneously altered; both screws must be turned together. If however we desire to avoid mistakes in using the Anomaloscope, we must always begin the examination with Nagel's or Stilling's plates, and then employ the Anomaloscope in a definite manner. We have found that the following method yields the quickest results.

First of all, we discover whether a red-yellow match can be made, then a green-yellow, and, finally, a Rayleigh equation is made. (The paper here gives more exact details of this examination in small print, which can be read in the original by those who wish to use the instrument.—T. H. B.)

After what we have said about the use of the Anomaloscope, it is at once obvious that a certain knowledge of the theory of colour vision and its anomalies is necessary before it can be employed. It is, however, as we have said, an instrument which in the hands of a doctor accustomed to deal with colour blindness, can render extraordinary service. We should not care to be without it.

An instrument also invented by Nagel, the *colour-matching apparatus* (*Farbengleichungsapparat*), is, according to our experience, just as useless as the Anomaloscope is useful. It is cheap and nasty. After using it for years, we have not discovered a single advantage in it. In cases in which we got a result of any value with it we obtained it much more quickly and easily with Nagel's and Stilling's plates. In many cases, moreover, it has led us astray. This occurred especially when the examinee was shown a yellow field near a red one. According to Nagel, we ought to know that we have before us a green anomaly because the candidate calls the yellow field near a red one, green. In our experience, nothing of the sort happens. We have found many who called this colour green, although they had absolutely normal colour perception. The reason is that the yellow is not pure, but a dirty dark yellow, and the examinee guesses a name for it. This test has shown us in the most brilliant way how great a mistake it is to base a colour perception test upon naming colours.

v. Kries has pointed out that "it is generally impossible to determine with certainty what or how other persons perceive, and that it is in consequence of little value to know how an examinee calls this or that coloured object."

Römer, in his text-book of ophthalmology, takes up the position that no method of colour-sense testing must be regarded as decisive in which the candidate has to name the colour.

Some years ago, Staff-Surgeon Lederer, of the Austrian Navy, undertook a research on the subject, "How often are colours correctly named?" Among 1,312 sailors whom he examined, 747 named the colours incorrectly, although other tests proved that they were not colour blind. This research convinced him that the names of colours were either unknown to certain individuals or else had been forgotten. The high percentage can be explained by the fact that in the Austrian Navy, which is collected from all over the monarchy, there is some language difficulty, and mutual comprehension is somewhat difficult. But even in our own Navy such cases are not seldom met with. Among the less intelligent recruits from East Prussia and Lithuania, and even among highly intelligent individuals, we constantly find that we must, as far as

possible, avoid naming colours, if we wish to obtain accurate results. The use of Nagel's colour-equating instrument has convinced us of the correctness of this view. It would be exceedingly desirable if we could have an apparatus which was cheaper than the Anomaloscope, and equally effective, but the colour-equating instrument does not fulfil these conditions.

We may now turn our attention to the tests which are chiefly used in practice, and which depend upon the use of pigment. Only two need be considered, *Nagel's plates* and *Stilling's pseudochromatic plates*. Both depend upon the system devised by Stilling of using variously coloured spots which appear the same to the colour blind and the colour weak ("Confusion Colours.") Stilling has made quadratic fields of these spots, choosing two colours for each plate. The spots of one colour form numbers, whereas the spots of the other colour form the background.

Nagel made his plates later, following out Stilling's principles. He, too, uses confusion colours, but he arranges the spots in a circle. Nagel lays great weight upon the fact that at a determined distance the image of a spot only falls upon the fovea. He has arranged them so because in certain disorders of colour vision the fovea behaves differently from the surrounding retina, and practically only the foveal vision has to be considered. Further, Nagel has tried to arrange the test in such a manner that with its help the differential diagnosis can be made between different kinds of colour blindness. We need not go into the manner of using Nagel's test: all our readers are perfectly acquainted with it. It is more essential that we should criticise the method.

Nagel has done a great service to colour vision testing by pointing out the incompetence of Holmgren's test, and in inventing a test which is a great advance upon it. His tests are convenient, cheap, and relatively simple. In consequence, even among specialists, they relatively soon obtained supporters. v. Michel, in the Berlin Ophthalmological Society, described the test as a great advance in colour sense testing, and as very reliable.

According to Rosmanis, who has been intimately associated with the question of sight testing on the railway, anyone who makes no mistakes with the test has normal colour perception. On the other hand, v. Siklossy stated at the XIVth International Medical Congress at Budapest, with reference to a suggested Statute for the general Inspectorate of the Hungarian Railways and Steamships, that the test is too difficult to manage. Answering the questions demanded too much "intelligence, education, and logical deduction," and was far too advanced for the candidates. Stilling found that a large number of people who could not read his tablets (new edition) easily passed the Nagel test. He thought that "Nagel's plates gave too much play to the judgment of the candidate, and that the distinction asked for between very dull greenish grey and pure grey left far too much to judgment." We find that this test makes us exclude the normal sighted, and we have also noticed that observant persons have passed the test, although they could not read the pseudochromatic figures.

Seydel comes to the same conclusion. Of 352 persons who, when tested with Nagel's plates, appeared to be colour blind or at least doubtful, 139, or 40 per cent., were found to have normal perception of colours when tested by other methods, Stilling's plates and the Anomaloscope. He also has noted that Nagel's plates have been read "pat off" by colour blind candidates. He especially notes a case of well-marked deuteranopia, who read Nagel's plates correctly. Seydel thinks Nagel's plates are too difficult for many not exactly unintelligent persons, especially regarding the difference between grey and green. Further, the test allows too much room for the personal opinion of

the examiner. One examiner sees colour blindness when a few green and grey spots are confused, another, less scrupulous, does not object to a candidate calling grey dots between red, green, and so overlooks an anomalous trichromatic. Seydel, since he has been able to confirm his results by a more exhaustive method, has gradually lost confidence in the value of Nagel's test.

We ourselves, after years of examination, have come to the conclusion that Nagel's plates have not come up to expectation. For this reason a criticism of Nagel's plates seems absolutely necessary, and the more so as they are by law *the sole examination method used in the Navy and on the Railways*.

We oppose Nagel's test, without prejudice, simply because we soon discovered that the examination results obtained with it were very often contradictory and inadequate, although we carefully followed out Nagel's directions. Nagel himself admits that doubtful cases turn up, which cannot immediately be cleared up by his plates, but one gathers from his description that such cases are very rare. Such is, however, by no means the case. It is the great defect of Nagel's plates that in order that doctor and examinee may understand each other, it is necessary to name the various colours. We have already shown how undesirable this procedure is. We have, however, actually on several occasions had the experience that the colours have been wrongly described when the colour sense was absolutely intact. We have also found that the difficulty people have in naming colours has caused a great waste of time.

Nagel has tried to make a differential diagnosis between different kinds of colour sense defect possible with his plates. It is true that in many cases we can make the distinction between protanopia and deuteranopia; often, however, when it is not possible, we employ control tests with the Anomaloscope. Usually, when Nagel's test is used for this purpose, we get an entirely fallacious result. We have constantly found cases in which the Nagel test gave protanopia as the defect, whereas the Anomaloscope proved it to be deuteranopia, and the reversed error has been equally common. For these reasons it seems to us best in practice to omit the diagnosis between protanopia and deuteranopia. In Nagel's latest edition he does the same, "because the colour sense of the red blind and green blind is of equally little value." In many cases, too, Nagel's test will not separate dichromatism from abnormal trichromatism.

We have constantly discovered people who, when examined with Nagel's tables, because they only confuse green and grey, appear to be abnormal trichomatics, but who, tested with the Anomaloscope, are found to be green-blind. In another case, which a second test with the Anomaloscope showed to be red-blind, only once using Nagel's tablets were grey and red and grey and green confused; all the other answers were correct, whereas a large number of Stilling's plates were not read. Further, one of us (Stargardt), in examining three railway officials who had all been declared by the official railway doctors, after examination with Nagel's test, to be abnormal trichomatics, was able to declare that in none of the cases was this defect present. In one of these cases, examination with Stilling's test and the Anomaloscope gave normal colour-sense. The second case read Stilling's plates easily, and the Anomaloscope proved the colour-sense to be normal. Red-yellow matches were not made, and the Rayleigh equation was made at 56, with the red-green screw, instead of 58, a value which lies within the physiological limit. In the third case, however, the Anomaloscope showed well-developed protanopia, and, as we would expect the majority of Stilling's plates were not read. Judging by our experience, we must say that it is not

possible to make an exact diagnosis of the nature of a colour defect with Nagel's test. We cannot agree with the almost general opinion, namely, that the ability to pass Nagel's test indicates a normal colour-sense.

(Six cases are described here, all of whom read Nagel's plates easily, and yet all were abnormal trichomatics.) From these examples it is clear that ability to pass Nagel's test is no criterion of normal colour-sense. It also shows that abnormal trichomatics can pass the test at one time, fail with it at another. This was constantly shown with Case 2. Here we have a further grave objection to Nagel's test. For if a man at one time passes the "official test," and when re-examined by the same test in later years fails, he may be seriously prejudiced in life. And this has, in our experience, happened often enough. This defect in the test accounts for the fact that the opinion of different examiners may not agree. We have often seen that one examiner has diagnosed abnormal trichromatic vision; the second, normal colour-sense; and the third, abnormal trichromatism again. It can easily happen that the examiner falls under suspicion of carelessness, a suspicion which, as we well know, may be entirely unmerited. Such uncertainty must undermine the confidence not only of the candidates but also of the officials.

As a result of our experience, we have come to the conclusion that *Nagel's plates do not constitute a test of colour-sense which is free from objection. It is therefore at least essential to demand that other tests should, at any rate, be used in addition to Nagel's test.*

The Anomaloscope cannot be considered as a suitable instrument for general practice, and the same is true of the colour equation instrument. For this reason, Stilling's test is not only to be recommended as a practical method, but it is indispensable. Stilling's test was discredited in its earlier days because it was badly produced. Some of the old editions had spots with a glossy surface. Such spots could be easily distinguished by the colour-blind, who have special powers of distinguishing differences of brilliancy.

We have found that our results with Stilling's test were always confirmed by the Anomaloscope. We have also noted that Stilling's test has shown up errors of colour-sense which have escaped detection by Nagel's test, and the result has been confirmed by the Anomaloscope.

Stilling did not claim to make a differential diagnosis of different kinds of colour blindness with his tests. This appears to us commendable, because such a diagnosis is not yet possible with pigment colours, as Nagel's test shows.

Stilling takes up the position that anyone who fails to read a single one of his plates has not a normal colour-sense, and should be excluded from any responsible post on the railways or at sea. We can confirm this opinion.

A great advantage lies in the fact that any naming of colours is unnecessary. Even children and those with a very limited intelligence understand at once what is expected of them. It is, of course, necessary to begin with the first three cards, which exhibit a strong contrast between the figures and the background.

An especial advantage of Stilling's plates is that the examiner has no need to trouble himself about the theory of colour blindness. This is a great gain, because not every doctor who is obliged to undertake colour vision testing has the time to read up the subject, a knowledge of which is necessary to use Nagel's test. Again, the use of Stilling's test does not give so much play to the opinions of the examiner as does Nagel's test.

A further advantage is, that Stilling's test detects blue-yellow blindness. There are also tests for unmasking malingerers. This is especially useful in the

Navy, where it not infrequently happens that a man simulates colour blindness to be sent ashore. We would also recommend the use of one or two dissimulation cards, which are easily made. They serve to defeat efforts made by railway employees to hide their errors of colour-sense, especially if the cards are shown not in a definite order, but one after the other.

Our opinion of Stilling's test is that it fulfils all that can reasonably be expected from a colour test. We only wish to deal with one more point, that is, the value of the different methods for examining large bodies of men. The demands made by the examination of large numbers are quite different from those made by a scientific examination. v. Kries has rightly urged that the chief thing in examining large numbers is that no abnormal man shall escape detection, and that the examination shall be rapid.

In this connection Stilling's test is easily the best. Our experience is that with this test one gets results much more quickly when examining a group of men. The reason is that even the less intelligent understand what is demanded, and because colour naming is absent from the test. Nagel's test is difficult to understand, because of the necessity to name colours, and because the less intelligent are confused by the sixteen colour tones found on these test cards. They have never been accustomed to such fine graduations: they consider and consider, and eventually make a guess, and thus, much time is lost and the results are of less value.

Our researches have led us to the following conclusions:—

The sole use of Nagel's test is not to be recommended, because, on the one hand, undoubted cases of colour blindness are overlooked by the test, and on the other, normal cases are held to be colour blind.

It is very desirable that Stilling's test be at least added to Nagel's as a second test. In all cases in which, with the help of these two tests, an exact diagnosis cannot be made, the candidate must be examined at a central station with the Anomaloscope. We would also advise that when a candidate appeals against the result of an examination, he be immediately examined with the Anomaloscope.

It is better to avoid a differential diagnosis of what kind of colour blindness is present when the examination is made with Stilling's or Nagel's tests, because experience has shown that such a diagnosis cannot be made with pigments. It is quite sufficient if the examining doctor writes that the candidate is "colour blind," and he should shortly explain the case by adding "the examinee did not read Stilling's plates 2, 4, and 5," or "he confused green and grey on Nagel's plates." It appears to us to be also necessary that at every test the date of the test cards should be noted, because the different editions of both Nagel's and Stilling's tests are by no means the same.

T. HARRISON BUTLER.

10.—GUIDE TO THE MICROSCOPIC EXAMINATION OF THE EYE.

(Continued.)

BY

PROFESSOR R. GREEFF,

DIRECTOR OF THE UNIVERSITY OPHTHALMIC CLINIQUE IN THE ROYAL CHARITY HOSPITAL, BERLIN,
WITH THE CO-OPERATION OF

PROFESSOR STOCK
(FREIBURG)

AND

PROFESSOR WINTERSTEINER
(VIENNA)

TRANSLATED FROM THE THIRD GERMAN EDITION,

BY

HUGH WALKER, M.A., M.B., C.M.,

OPHTHALMIC SURGEON TO THE VICTORIA INFIRMARY, GLASGOW.

II.

SPECIAL PART.

Cornea.

LAYERS OF THE CORNEA.

The surface of the cornea is covered by transparent *Stratified Pavement Epithelium*. The superficial cells are flattened. Those of the middle layers are rounded or polygonal, and possess protoplasmic processes connecting the surfaces of adjacent cells (prickle-cells). Those of the deepest layer, basal cells, are elongated and cylindrical. Between the epithelial cells there is a system of lymphatic spaces, but these, as a rule, are not visible. They become very apparent, however, when the corneal epithelium is swollen and œdematous. The prickle-cells are then pushed aside, so that their processes become evident, and between them, as well as between the other cells, the lymphatic spaces can be seen.

The second layer of the cornea is called *Bowman's Membrane*, and it must be considered as the uppermost layer of the substantia propria. It is composed of condensed fibrillæ of connective tissue, and therefore does not belong to the group of elastic membranes.

The *substantia propria*, forming by far the greater part of the cornea, consists of a connective tissue ground-substance with cellular elements and nerves. The ground-substance is arranged in lamellæ, which lie one above another. The lamellæ themselves are made up of small bundles of connective tissue fibrillæ held together by fine but strong cement substance. A few oblique bundles unite neighbouring lamellæ. Between the lamellæ is the lymph-canalicular system discovered by von Recklinghausen. The canaliculi exhibit dilatations, the *Lacunæ*. At fairly definite intervals cells are found in these lacunæ, and a knowledge of these is of the first importance to the pathologist, since they have played a prominent part in the investigations into the nature of inflammation. Two kinds of cells occur in the cornea.—1. The *corneal corpuscles*, discovered by Virchow, and by Cohnheim appropriately called *fixed corneal cells* to distinguish them from the second variety. They are flattened and star-shaped, with numerous long processes. They lie in the lacunæ, and send their processes along the canaliculi to join the processes of neighbouring cells. A lacuna contains usually only one cell, and this does not quite fill the space. 2. There are also found in the canalicular system, as von Recklinghausen has shown (*Virchow's Archiv*, Bd. XXIII, S. 157), so-

called *migratory cells*, although in small numbers under normal conditions. These are round cells which have found their way into the cornea from the marginal capillary loops, and are indistinguishable from the round cells found in other organs. They are smaller, and in the recent condition more highly refracting, than the fixed cells, and, unlike these, exhibit amœboid movements which enable them to change their shape and position.

The most posterior layer of the cornea is the *Membrane of Descemet*. It is a strong, elastic, homogeneous layer, presenting in transverse sections bright highly refracting striæ. It is very resistant. When ulceration has destroyed the anterior layers of the cornea, the membrane of Descemet may for a considerable time alone prevent rupture; when finally it does yield, or when it is pierced in injuries of the cornea, it behaves like an elastic structure, the margins of the opening retracting and becoming curled on themselves.

The posterior surface of Descemet's membrane is covered with a delicate but close mosaic of *polygonal endothelial cells*, which pass over on to the ligamentum pectinatum iridis and the anterior surface of the iris.

Cross sections through the normal human cornea.—Staining with hæmatoxylin. Differentiating. Counterstaining with eosin or orange G.

Tangential sections.—In these the epithelial covering is visible at the margins owing to the curvature of the cornea.

CORNEAL EPITHELIUM.

Epithelial cells.—The form of these cells is best exhibited in teased preparations. The cornea of a calf or pig should be selected, because in these animals the epithelial layer is more pronounced than in man. The cornea is removed and placed in a macerating solution, *e.g.*, a 10 per cent. salt solution, Müller's fluid diluted with two parts of water, or, best of all, 30 per cent. alcohol (Vossius). On the second day the upper layers can be removed in the form of a thin pellicle; on the third day the deeper layers can be detached by gentle rubbing with a cataract needle. The examination is made in water or glycerine, the mass resolving itself into its individual cells. These are very varied in shape. (*Cf.* Vossius, *von Graefe's Archiv*, Bd. XXVII, Heft. iii, S. 237.)

Karyokinetic figures can be demonstrated in the corneal epithelium of the calf, and in that of other animals after injury to the cornea.

Silvering of the Epithelial Cells.—Surface view. The surface of a frog's cornea is rubbed with a pencil of nitrate of silver till it becomes dull white. The head of the animal is then removed and exposed in a vessel containing water slightly acidulated with acetic or formic acid. The cornea becomes dark brown after $\frac{1}{4}$ -1 hour, the time depending on the intensity of the illumination. It is next excised and spread out on a slide, radial cuts being made through the margins if necessary, and then mounted in glycerine. In this way a positive silver image is obtained. The protoplasm of the cells varies in colour from light to dark brown. The cell boundaries stand out clearly, the intercellular substance being unstained. (*Cf.* Sattler, *Archiv für mikroskop. Anatomie*, Bd. XXI, 1882.)

The corneal epithelium possesses a well-marked *Intercellular Lymph System*. This is very prominent when the cornea is oedematous (glaucoma, panophthalmitis, iridocyclitis, haziness of the cornea), the prickle-cells becoming separated by the effusion of lymph so that their processes are easily recognised. Between the deeper cells drops of liquid may often be seen arranged in the form of a rosary.

Leber has suggested a method whereby this condition is artificially produced. He injects oil of turpentine into the superficial layers of the substantia propria, whence it finds its way into the spaces between the epithelial cells. For

microscopic purposes tangential sections are made from the cornea, either while this is fresh, or after it has been hardened for a few days in Müller's fluid. The sections should include a very thin layer of the ground-substance, which serves to prevent the turpentine from oozing out. They are then carefully rinsed, and placed for a short time in a 1 per cent. solution of osmic acid. In this the turpentine acquires a dark colour, thus revealing its distribution between the cells. (Cf. Leber, *von Graefe's Archiv*, Bd. XXIV, Heft i, S. 265; Fuchs, Bd. XXVII, Heft iii, S. 66.)

CORNEAL FIBRILLÆ.

Lamellæ of the substantia propria can be resolved into very delicate fibrillæ when the cement substance has been dissolved. Small pieces of hardened corneæ are placed for 24 hours or longer in a concentrated solution of picric acid, and then teased as finely as possible with two needles. Alcohol. Oil. Canada balsam. Staining is unnecessary, but can be carried out if desired.

CORNEAL CELLS AND LACUNÆ.

These can be readily demonstrated in the fresh condition, often, indeed, better than in silver preparations. The complete cornea of a small animal or a portion of a large cornea is removed with the utmost care, all crushing and stretching being avoided, and placed in a glass cell along with some aqueous fluid. A cover-glass is applied, and the margin of this is brushed with oil to prevent evaporation. Thus treated the preparation keeps for 24 hours. M. Schultze recommends the slide to be placed on a warm stage (30°-40° C.). In the frog's cornea the migratory cells become visible after 10 or 15 minutes, and if the stage is warm their movements are more active.

After about an hour the lymph-canalicular system and the fixed corneal corpuscles are distinguishable. (Waldeyer, *Graefe-Saemisch's Handbuch*, Afl. 1, Bd. I.)

FIXED CORNEAL CORPUSCLES.

(a) *Ranvier's Gold Chloride Method*.—Ranvier (*Lehrbuch der hist. Technik*) has employed chloride of gold to demonstrate the fixed corneal corpuscles. The result of the treatment is that the corpuscles with all their processes present delicate pictures tinted dull red, while the substantia propria of the cornea remains colourless. These are "positive images" as opposed to the "negative images" produced by the silver method in which the substantia propria is impregnated, while the lymphatic spaces and the cells are unstained.

1. The juice of a fresh lemon is expressed, and filtered through flannel. Small corneæ, removed from the animals immediately after death, are placed in this *in toto*. The cornea of a frog or of a small mammal, such as the guinea pig or rabbit, is left in the juice for about five minutes. Larger corneæ remain longer.

2. The cornea is then washed for one minute in about 5 c.cm. of distilled water.

3. It is placed in 10 c.cm. of a 1 per cent. solution of chloride of gold, and kept in the dark for 15 minutes.

4. It is transferred by means of a glass lifter to 10 c.cm. of distilled water, and washed for a few minutes.

5. It is next placed in 50 c.cm. of water containing two drops of acetic acid, and exposed to the light. The reduction process lasts two or three days, and is controlled by examination under the microscope. The fixed corneal corpuscles, and sometimes also the nervous fibrillæ, are impregnated.

6. When reduction is complete, the tissue is placed in 70 per cent. alcohol, and left in the dark for 24 hours.

Thin lamellæ are detached from the posterior surface by means of a scalpel and needle, and mounted in dammar varnish; or, the cornea having been imbedded in celloidin, tangential sections are made with the microtome. The corneal corpuscles, like the lymph spaces, are arranged most regularly towards the back of the cornea. The most beautiful pictures are therefore obtained from this region.

(b) *Drasch's Method*.—This also yields excellent preparations of the corneal corpuscles (Stöhr, *Lehrbuch der Histologie*). The cornea is removed from the animal, not immediately after death, but 12-24 hours later, the body being meanwhile kept in a cool place. Small pieces, about 6 mm. square, are taken and placed in the dark for one hour in a mixture of—

Solution of gold chloride, 1 per cent. ... 5 c.cm.

Distilled water 5 c.cm.

During this period the mixture should be stirred from time to time with a glass rod. The pieces are then transferred by means of a glass section-lifter to 30 c.cm. of distilled water, and remain in this in the dark for 8-16 hours, after which they are placed in a mixture of—

Formic acid 5 c.cm.

Distilled water 25 c.cm.

and exposed to daylight. When reduction is complete, the pieces are of a dark violet colour, and are then hardened for six days in alcohol gradually increased in strength. Tangential sections are made and mounted in dammar varnish.

LYMPH-CANALICULAR SYSTEM.

(a) *Silvering of the Cornea*.—Negative images. Stricker's Method.

The cornea of a fresh eye, *e.g.*, a frog's, is exposed for a moment to the vapour of boiling water. The epithelium can then be easily scraped away. The surface of the cornea is next cauterised with nitrate of silver. It is not, however, always necessary to remove the epithelium; the silver may be applied to the surface of the cornea while this is still intact.

The eye is washed in distilled water.

It is then placed in 50 c.cm. of distilled water containing 2 drops of glacial acetic acid, and exposed to sunlight for 24 hours, until it has become brown.

The cornea is removed and divided, and the pieces are hardened in alcohol gradually increased in strength. Tangential sections are made. As in the gold method, the most beautiful pictures are obtained from the posterior layers of the cornea, where the canaliculi and spaces are more regularly arranged. The ground-substance appears bright or dark brown; the lymphatic canals and their contents are colourless.

Thin corneæ from small animals can be mounted as a whole, a few radiating incisions being made so that they lie flat. In the case of large corneæ, lamellæ are removed from the posterior surface, or thick sections are cut.

(b) *Puncture Injections with Berlin Blue*.

(c) *Leber's Method*.—The fresh cornea of a frog, or a part of the cornea of a larger animal, is placed in a 1 per cent. solution of ferric sulphate. After a few minutes it is removed, and, the epithelium having been gently stripped from its surface, again returned to the liquid for 5 minutes. It is then washed, and placed in a 1 per cent. solution of ferrocyanide of potassium, in which it acquires a blue colour. It is once again washed in water, and examined in glycerine, or hardened in alcohol. The lymph spaces appear as colourless gaps in the field of the blue ground substance. (*Cf. von Graefe's Archiv*, Bd. XIV, Heft iii, S. 300.)

(d) *Altmann's Corrosion Methods*.—These methods are based on the circumstance that fats hardened with osmic acid withstand the action of Eau de

Javelle (solution of hypochlorite of potash) for a long time. They yield *Corrosion Preparations*. Olive oil is injected in the manner already described into the corneal spaces. Pieces of the cornea are then hardened in osmic acid, and cut with the freezing microtome. The sections are placed in a concentrated watery solution of hypochlorite of potash till the tissues are dissolved, and only the dark casts of the lymphatic spaces are left in the form of black strands. The sections must be carefully handled since they are very brittle. (*Archiv. für mikroskop. Anatomie*, Bd. XVI, S. 471. 1879.)

Altmann's Oil-Impregnation Method is a similar process. The cornea should be as fresh as possible. If thin, it may be treated as a whole; if thick, it should be divided into two parts. The tissue is placed for eight days in a mixture of

Olive oil	...	...	...	...	2
Absolute alcohol	...	...	...	...	1
Sulphuric ether	...	...	...	...	1

The pieces are then washed in running water for a few hours, hardened in osmic acid for 24 hours, and treated with Eau de Javelle diluted with an equal quantity of water, till all the tissue is dissolved.

CORNEAL NERVES.

(a) *Cohnheim's Gold Chloride Method*.—Cohnheim introduced the gold method, employing it for the demonstration of the corneal nerves.

1. A mixture consisting of:—

Solution of chloride of gold, 1 per cent. ... 8 c.cm.

Formic acid ... 2 c.cm.

is placed in a test tube, and heated over a flame till it boils up three times. It is then poured into a watch-glass and allowed to cool. Fresh pieces of the cornea are placed in this, and left in the dark for about half an hour.

2. They are washed for a few minutes in a watch-glass in distilled water.

3. The pieces are then exposed to daylight in a mixture of—

Formic acid... 10 c.cm.

Distilled water ... 40 c.cm.

Here reduction goes on, and the pieces become gradually dark violet, the process lasting two or three days.

4. The pieces are next placed in about 30 c.cm. of 70 per cent. alcohol, and left in the dark for 24 hours.

5. They are transferred to the same quantity of 90 per cent. alcohol, and kept in the dark for several days to prevent further reduction.

Cross sections may be made. Tangential sections are, however, to be preferred. In these latter, on account of the curvature of the cornea, the epithelium and the subepithelial nervous plexus are well displayed at the margins.

N.B.—Steel instruments must not be brought into contact with gold solutions. All manipulations should be carried out by means of glass or wooden lifters.

(b) *The Golgi-Cajal Method* yields beautiful pictures.

(c) *Ehrlich's Intra-Vitam Methylen Blue Method* is also suitable.

ELASTIC FIBRES.

These are present at the margin of the cornea. They may be stained with *Orcein* or by *Weigert's Method*.

Descemet's Endothelium.—This can be stripped off in the form of a pellicle after maceration of the cornea in 10 per cent. salt solution or in 30 per cent. alcohol. Staining and mounting.

CELL BOUNDARIES OF DESCMET'S ENDOTHELIUM.

Ranvier employs silver nitrate to demonstrate these.

1. Pieces of the cornea are placed in $\frac{1}{2}$ per cent. solution of nitrate of silver till they begin to lose their transparency
2. They are washed in distilled water.
3. They are transferred to a 2 per cent. solution of acetic acid, and exposed to sunlight till they become brown.
4. They are again washed in distilled water.
5. Examination in glycerine, or hardening in alcohol gradually increased in strength.

INFLAMMATION OF THE CORNEA.

The centre of a rabbit's cornea is punctured with an infected needle. After a few hours migratory leucocytes may be seen making their way from the marginal capillary loops towards the wound. The longer the examination is delayed, the more numerous are the cells found in the section. Hardening in corrosive sublimate. Staining with hæmatoxylin.

The immigration of leucocytes is still more active if a small cavity, made in the centre of a rabbit's cornea, is filled with a culture of virulent staphylococci, *e.g.*, from an abscess. The eye is enucleated after 18-24 hours. Tangential sections are made, stained with Delafield's hæmatoxylin, and differentiated. The infiltrating migratory cells contain, in the case of the rabbit, in nearly every instance eosinophilous granules. Some of the cells are oval; others are in the form of elongated spindles. (*Cf.* O. Schaudigel, *von Graefe's Archiv*, Bd. XLIII, S. 392.)

INCISED WOUNDS OF THE CORNEA.

If the centre of a cornea has been perforated, and the tissue is examined at various intervals afterwards, it is possible to observe the peculiar inward growth of the epithelium, the apposition of the lamellæ, and the curling of the Descemet's membrane.

NEWLY FORMED BLOOD VESSELS IN THE CORNEA.

Straub's Method.—The cornea is infected with aspergillus spores. When the new vessels appear on its surface, the cornea is removed, stained in eosin, and mounted in balsam.

(*To be continued.*)

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—THE EYE LESIONS OF INSULAR SCLEROSIS.

—————

Velter, E.—Lesions of the visual paths and of the oculo-motor apparatus in insular sclerosis. (Des lésions des voies optiques et de l'appareil oculo-moteur dans la sclérose en plaques.) *Archives d'Ophtalmologie*, décembre, 1912.

The ocular symptoms of insular sclerosis have attracted considerable attention both from neurologists and ophthalmic surgeons, but few communications have been made which deal with the lesions lying at the root of those symptoms.

Velter, of Paris, has already published an account of the pathological anatomy based upon the complete examination of four cases (*Thèse de Paris*, 1912, and *Archives d'Ophthalmologie*, septembre, 1911), and he now returns to the subject, which he discusses at some length, more particularly from the pathological standpoint. The communication is most liberally illustrated.

Evolution.

Eye symptoms may appear at any stage in the course of insular sclerosis, but they are commonest when some of the cerebral or spinal manifestations of the disease are already in evidence. Sometimes it is ocular paralysis and nystagmus, sometimes it is amblyopia, that leads to the discovery of the changes in the optic disc. The evolution is peculiar. The beginning is often sudden; the functional are not in proportion to the ophthalmoscopic signs; and more or less complete recovery may take place, but after some time recurrences may occur without obvious cause. All the disturbances are markedly increased by fatigue, which exaggerates nystagmus, the difficulty of moving the eyes, accommodative asthenopia, and the changes in the visual field. Amblyopia itself is notably increased by prolonged reading or writing, and it is probable, as suggested by Claude and Egger (*Rev. Neurol.*, mars, 1906), that the rapid exhaustion of the visual pathways is due to demyelination of the axis cylinders.

More interesting still are those forms of insular sclerosis which commence with ocular disturbances. In ten such cases collected by Velter, this mode of onset preceded the development of other signs by periods that ranged from a few months to six years. The first symptom usually takes the form of a sudden ocular paralysis, especially ptosis, or a considerable visual disturbance, with central scotoma, without ophthalmoscopic lesions, unless it be a trivial hyperæmia of the optic disc. The symptoms of retro-bulbar neuritis are indeed very common. Fleischer (*Klin. Monatsbl. f. Augenheilk.*, Februar, 1908) states that nearly one-half of such cases among young subjects are due to insular sclerosis. Its evolution is nevertheless somewhat different from that of other forms of retro-bulbar neuritis. Thus, improvement is rapid, the central scotoma rarely persists, and changes in the optic disc do not make their appearance until long after the original attack. Cure is sometimes complete without ophthalmoscopic changes. In another group of cases optic neuritis may be the first manifestation of insular sclerosis.

Diagnosis.

Whenever in a young subject we meet with ocular disturbances, not to be explained by a local or general cause, we should always think of the possibility of disseminated sclerosis. Sudden onset of the lesions, their capricious and irregular evolution, and their frequent recurrence all tell in favour of insular sclerosis. Some cases are also characterised by transitory attacks of monoplegia or hemiplegia, very suggestive of the disease. The greatest importance must be attached to abolition of the abdominal and cremasteric reflexes, now known to be an early symptom of disseminated sclerosis. The distinction between cerebro-spinal syphilis, on the one hand, and insular sclerosis, on the other, may be extremely difficult. Examination of the eyes, although helpful, may be inadequate to tell one affection from the other, although the pupillary changes are different in the two affections, so that their diagnostic value

becomes considerable. Inequality of the pupils is much more frequent in general paralysis than in multiple sclerosis; it is accompanied by irregularity in the contour of the pupils, and the Argyll Robertson sign exists in about two-thirds of the cases. In making the diagnosis between the two conditions, attention should be paid to the following points:—(1) the early appearance of spinal symptoms; intermittent claudication, disturbances of the sphincters; (2) the results of lumbar puncture, which in cerebro-spinal syphilis constantly shows lymphocytosis, while in insular sclerosis the cerebro-spinal fluid is normal or presents a very slight lymphocytosis; (3) the existence of pupillary symptoms, particularly the Argyll Robertson phenomenon; and (4) the results of the Wassermann reaction.

Pathological Anatomy.

1. **Lesions of the visual pathways.**—The visual tracts are often attacked by sclerosis, the patches of which are disseminated throughout the nervous system wherever neuroglia is normally present. The visual paths are, in fact, rich in neuroglia in their entire extent. Simple inspection of the parts is altogether inadequate to identify the exact site and extent of the sclerotic changes. In

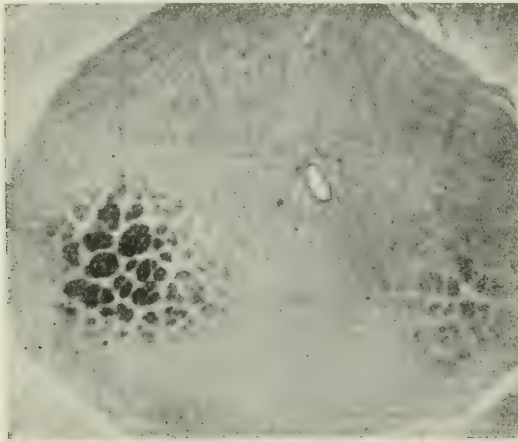


Fig. 1. Right optic nerve. Transverse section at about 6 mm. from the papilla. Diffuse sclerosis leaving intact only two groups of fibres, of which several are already strongly demyelinated. Pal's method. Obj. 2, Zeitz.

some instances of long standing and diffuse sclerosis, we may note a reduction in the volume of different segments, which appear slender and attenuated in all their parts. A grey uniform colouration may be recognised on their surface, but it is exceptional to observe well-localised grey spots if we are dealing with ancient sclerosis, or softer spots, of a rosy colour, if we are dealing with younger *plaques*. We may sometimes perceive thickenings of the pia mater, but, in general, the meninges are macroscopically healthy, and at the level of the optic nerve, in particular, there is neither thickening of the sheaths nor meningeal symphysis. In fact, the only way to gain precise notions with regard to the localisation of the sclerotic lesions is by the study of serial sections. By this method of examination it can be shown that all parts of the visual pathway may be affected by the sclerotic changes, which, however, are not distributed according to any systematic or definite plan.

The optic nerve may be involved at any point in its course from the papilla to the chiasma. It is, however, rarely affected as a whole. Even in advanced

cases the medullary sheaths nearly always persist at certain points. Whatever its position, the limits of the lesion are seldom clearly defined, thereby contrasting with the well-defined nodules found in the brain or spinal cord. The sclerotic changes are most constant and most important in the anterior division of the optic nerve—that is to say, from the papilla to the point where the central vessels enter the optic nerve. Sclerosis sometimes begins behind the lamina cribrosa, occupies the region of the central vessels, and ceases abruptly behind that point, the posterior part of the nerve remaining normal. It is commoner for the deposits to be scattered irregularly through the thickness of the nerve trunk, although the maximum changes are always to be observed in the neighbourhood of the central vessels (Fig. 1). Behind the papilla one may find large deposits involving the whole of the nerve and interrupting all the medullary sheaths, some of which resume their normal characters posterior to the disease focus (Fig. 2). These retro-papillary



Fig. 2. Right optic disc. Section passes a little below the central vessels. Sclerosis especially intense on the nasal side. Large retro-papillary foyer. Excavation of the disc. Pal's method. Obj. 2, Zeitz.

nodules may determine more or less marked changes in the optic disc—papillary stasis or optic neuritis in recent deposits, or atrophy in long-standing cases. The existence of nodules in the retro-bulbar segment with integrity of the intraocular portion of the optic nerve, allows us to explain those cases so often observed where a more or less marked disturbance in sight is unaccompanied by any visible ophthalmoscopic change. Lesions of the posterior segment of the optic nerve are both less constant and less marked than those of the retro-bulbar segment. The canalicular segment of the optic nerve is the part least prone to sclerotic changes. The intra-cranial segment, on the contrary, is a favourite site, and in all cases examined by Velter, very pronounced lesions, the topography of which was almost identical, existed there. The sclerosis commences in the vicinity of the large conjunctival septa which originate from the sub-pial connective tissue, and which include, as a constant thing, vessels of some size. Thence the *plaque*, gaining in depth, extends little by little to all the central region. These deposits in the intra-

cranial segment usually extend backwards and become united with other deposits originating from the chiasma.

The chiasma, again, is another favourite site for the anatomical lesions of insular sclerosis, and in that region their limits are very clearly defined. They may occur at any point in the chiasma. They may occupy its central part alone, or extend forwards and backwards as far as the optic nerves, on the one side, and the optic tracts, on the other. The posterior border of the chiasma is always the seat of a very accentuated neuroglial sclerosis, probably on account of the anatomical disposition and constitution of the part.

The optic tracts may be affected at any point of their course. Scattered deposits are the rule. These determine only local lesions, and do not produce degeneration at a distance.

Velter has been able to examine the intracerebral visual pathway in a single instance only. He found large *plaques* of sclerosis, of irregular limits, which seemed to have taken origin around the occipital horn, where the sub-ependymal sclerosis was very marked. These deposits, extending as "oil-stains" into the white substance of the occipital lobe, involved the optic radiations at several points.

To recapitulate, then, sclerotic deposits may be found in any part of the visual path, although they affect by preference certain spots, such as the region of the central retinal vessels, the intracranial segment of the optic nerve, and the chiasma. They are disseminated without any attempt at systematisation, and they do not determine secondary degeneration.

The most important and constant histological changes are to be found in the nerve-fibres, the neuroglia, and the blood vessels.

One of the essential characteristics of these lesions is a change in the medullary sheath. In recent cases we observe merely the commencement of the disintegration of the myeline, and then only by employing Marchi's method of staining. In more advanced conditions demyelination is complete, so that the axis cylinders lie naked in the midst of the sclerotic tissue. Inasmuch as the axis cylinders usually persist despite the profound changes in the medullary sheaths, there is, as a rule, an absence of secondary degeneration, whether ascending or descending. Some of the axis cylinders, however, do show changes, such as hypertrophy, atrophy, fusiform or spherical swellings, bifurcation, or even dissociation (André Thomas). But in any case some of the fibrils persist, and are competent to assure the continuity of the fibre.

As regards the neuroglia, very active cellular proliferation goes on in the recent *plaques*, and this is nearly always accompanied by an increase in the number of the capillary vessels, the walls of which present certain alterations to be mentioned presently. In older deposits, on the contrary, few nuclei are to be found, but the fibrils form a thick feltwork, in which sclerotic vessels may be recognised here and there.

To sum up, we may say that neuroglial sclerosis presents its customary characters when it affects the optic pathways, but in the optic nerve the texture of the plaque is different from what it is in the white substance elsewhere, and that its peculiar fasciculated arrangement is due to the existence of connective tissue septa in the optic nerve.

Vascular changes are often present in the sclerotic areas. In recent deposits, the walls of the vessels, although infiltrated with round cells, are but little thickened. In long-standing deposits the scene is dominated by vascular and peri-vascular sclerosis. The central vessels are almost constantly the seat of analogous lesions.

It is impossible to say whether the nerve-fibres, the neuroglia, or the vessels are the starting-point of the changes. But the inflammatory nature of certain lesions, together with the constancy of the vascular modifications, speaks in favour of the infective origin of insular sclerosis.

En résumé, the lesions of the optic pathways in multiple sclerosis are identical with those found in the central nervous system. One finds demyelination of the nerve-fibres (not accompanied by secondary degenerations), alterations in the axis cylinders, neuroglial sclerosis, and vascular lesions. The deposits in the optic nerve, however, present a special texture due to the existence of connective tissue septa.

2. Lesions of the Oculo-Motor Paths.—The changes in the oculo-motor nerves are due to peduncular or protuberant *plaques*, the localisation of which is very variable according to the case.

These lesions may be classified as (a) nuclear and (b) radicular.

(a) *Nuclear lesions.*—Deposits of sclerosis may be present in the oculo-motor nuclei. The nuclei of the third pair are often implicated by a peri- or endependymal nodule, which is propagated towards the interpeduncular space. Small deposits, independent of neighbouring *plaques*, capable of damaging the nuclei in whole or in part, may, however, be present. Neuroglial sclerosis may envelop the large motor cells, which otherwise remain normal. But at other points the changes may be more destructive, causing atrophy of the cells, destruction of their prolongations, and so forth. The nuclei of the fourth and the sixth pair may suffer in like manner.

(b) *Radicular lesions.*—In the cerebral peduncle the sclerotic nodules of the interpeduncular space often involve the fasciculi of the radicular fibres of the third pair. These lesions are always localised, and do not destroy the continuity of the fibres. The hypertrophic neuroglial tissue englobes the nervous elements, which there pursue a longer or shorter course. It is common to see large patches exposed on the surface of the peduncles, encompassing the radicular fibres at their emergence. The fibres of the fourth pair in their intra-peduncular course often traverse large peri-ependymal deposits of disease, whence the superior cerebellar peduncles are propagated to the valve of Vieussens. The changes in the fibres have here still the same characters. As to the radicular fibres of the sixth pair, they may in their long course be involved by *plaques* perhaps developed in the upper and internal part of each peduncle or perhaps in the neighbouring regions of the pyramidal fasciculi. They may also be involved at the level of their emergence. But there exist other radicular lesions besides those situated in the interior of the cerebral trunk; the neuroglial sclerosis may be more or less prolonged upon the roots after their emergence, and give rise to the production of a series of small but distinct deposits in their course. There exists, in fact, in the roots of the oculo-motor nerves a neuroglial framework, which may be the seat of special pathological processes of the same kind as those which effect the neuroglia of the centres. As regards the roots of the third pair, the lesions may be followed as far as the point where all the fasciculi are united; at that place the nervous trunk is constituted, all neuroglial sclerosis ceases, and, with it, all changes in the nerve fibres, save occasionally some discrete descending degeneration, originating from a lesion of a certain number of nuclear cells. It is the same for the fourth and sixth pair, where the sclerosis may be prolonged for a distance of 5mm. to 6mm. after their emergence. The nerve trunk is normal beyond that point, for all lesions cease where the neuroglia ends.

Lesions of the oculo-motor association paths in insular sclerosis are little understood. At the same time cases are not exceptional where we observe

changes in the posterior longitudinal fasciculi, and sclerosis in the region of the corpora quadrigemina, where (at least in part) the supranuclear co-ordinating centres seem to lie.

Conclusion.

Certain peculiar clinical facts may be readily explained by the nature of the anatomical lesions found in the optic and oculo-motor pathways in disseminated sclerosis. The outstanding feature of the disease is the preservation of the anatomical and functional continuity of the nobler element of the nerve fibres, namely, the axis cylinders. In this way we may explain why complete blindness does not follow the seemingly profound changes in the optic nerves and the chiasma. It also allows us to comprehend the rarity of hemianopsia, which should be so common in this disease when we consider the frequency and extent of the lesions of the optic paths behind the chiasma. The remarkable improvement in the oculo-motor symptoms and the visual defects is to be readily explained by regeneration of the nerve-fibres. Finally, the contradictions that exist between the functional and the physical signs, on the one hand, and the anatomical lesions, on the other, are explained in the case of the visual symptoms with the same clearness as they are for the other elements of the syndrome, when for example, disseminated *foyers* of the pyramidal tract betray their existence only by slight spasmodic disturbances, or when an intense sclerosis of the roots and the posterior cords determines merely insignificant alterations of sensibility.

SYDNEY STEPHENSON.

II.—"HOLES" AT THE MACULA.

- (1) **Zentmayer, W.**—Hole at the macula. Report of two cases. *Annals of Ophthalmology*, July, 1909, p. 472.
- (2) **Berche.**—Holes of the macula. (Trous de la macula.) *Recueil d'Ophthalmologie*, juillet, 1911.
- (3) **Zeeman, W. P. C.**—On the formation of holes and cysts in the fovea centralis. (Ueber Loch- und Cystenbildung der Fovea centralis.) von Graefe's *Archiv f. Ophthalmologie*, Bd. LXXX, Heft ii, November 7, 1911.
- (4) **Deutschmann, R.**—On the formation of holes in the macula. (Ueber Lochbildung in der Macula.) *Zeitschrift für Augenheilkunde*, Januar, 1912.

(1) **Zentmayer**, of Philadelphia, records two cases of this condition :

In the first case, that of a negro boy, there was a clear history of accident, the left eye having received a blow by a piece of wood. The anterior chamber was two-thirds filled with blood, and the tension was increased. Paracentesis of the anterior chamber was performed, which relieved the tension. The ophthalmoscope showed, at the termination of treatment, a deep glaucomatous excavation, with a sharply-cut circular area at the macula about the size of the head of a lead pencil, the floor of which was a little darker than the surrounding choroid.

In the second case, also in a coloured subject, there was no history of accident to the eye, but there was present a scar on the forehead, received in childhood. The fundus oculi showed the macular branch of the superior temporal artery to be sclerosed and accompanied by white lines upon either side. Just above the fovea was a glistening-white fluffy round mass, probably connective tissue. Beyond this the vessel turned abruptly downwards to the temporal

side of the macula. The foveal region presented a sharply circumscribed perfectly round reddish-brown area, in diameter about one-third that of the disc. The surrounding retina was hazy and showed numerous shifting reflexes, more marked on the temporal border of the macula. JOHN WHARTON.

(2) **Berche** discusses the pathogenesis of holes at the macula, and gives a brief historical account of the subject. He is of opinion that holes in the macula are due to œdema of the retina at the posterior pole of the eye, not necessarily at the macula only, and when the appearances of a hole are produced it is necessary that all the layers of the retina be involved. The œdema may be the result of contusion of the globe, of the presence of toxins in the vitreous due to iridocyclitis or disease of the retinal vessels. He does not favour the theory of formation of holes by *contre-coup* as formulated by F. Menteith Ogilvie.

The author reports two cases of holes at the macula. In the first case there was an injury, a foreign body having penetrated the lid and become imbedded in the sclerotic. At first there was diffuse white opacity of the fundus but no macular lesion, but after eight days the diffuse opacity was associated with the appearance of a macular hole, central scotoma, and reduction of vision to 1/10.

In the second case there was no history of injury, but there was disseminated choroido-retinitis with greyish pigmented exudates. The horizontally oval macular hole was associated with central scotoma and V. 1/20, which improved to 1/10 under treatment. J. JAMESON EVANS.

(3) **Zeeman**, of Amsterdam, thinks that a zone round the fovea centralis retinae has a peculiar liability to injury and disease from the nature of its circulation. This is also the cause why cysts are there more common. Genuine holes are caused by the confluence of cysts, or by their rupture, due to the retraction of scar-tissue in their neighbourhood. A similar vulnerability prevails within the ora serrata, especially in its temporal portion.

R. GRUBER.

(4) **R. Deutschmann**, of Hamburg, adds some interesting cases of "holes" in the macula to a literature which he states is still very small. We know that in many instances there has been a non-perforating trauma of the eye, but the exact mechanism of the process is not yet clear. Fuchs states in v. Graefe's *Archiv* Bd. LXXIX, Heft i, that the destruction of the retina is accompanied by cavern-formation. We know far too little of the ætiology of cases in which there is no trauma, and, therefore, Deutschmann considers it worth while to publish his cases *in extenso*.

The first case is of great interest. When first seen, there was a rectangular yellowish-white patch, which soon became surrounded by a star figure, suggesting albuminuric retinitis. No trace of albumin was found. The condition is shown by a coloured plate. Similar patches now appeared round the pupilla, chiefly along the vessels. Soon a hole appeared in the retina at the macula. A hole in the retina, two disc diameters in size, was detected near the periphery of the fundus. The macular hole became sharply defined and was rectangular, and a third small hole appeared close to it. This hole soon disappeared. Eventually, the macula hole healed up, leaving a grey patch in its place. This patient gave a strongly positive Wassermann reaction. Deutschmann discusses the case at some length, pointing out that it is in many respects unique.

The four other cases noted were all associated with high myopia, but Deutschmann rather hesitates to ascribe the hole directly to the myopia, although he admits that such may be the case. T. HARRISON BUTLER.

III.—THE FIELD OF VISION.

- (1) Schirmer, Otto.—A case of incongruous homonymous hemianopsia. *Archives of Ophthalmology*, March, 1911.
- (2) Sattler, C. H.—On the field of vision in glaucoma. (Ueber das Gesichtsfeld bei Glaucom.) *Zeitschrift für Augenheilkunde*, Januar, 1912.
- (3) Parker, F. J.—Bilateral papillœdema with central scotoma, from sinusitis. *Ophthalmology*, January, 1912.
- (4) Fleischer, Bruno.—The Bjerrum method of investigating the field of vision and its results in glaucoma. (Ueber die Bjerrumsche Methode der Gesichtsfelduntersuchung und über ihre Resultate beim Glaukom.) *Klin. Monatsbl. f. Augenheilkunde*, Juli, 1912.
- (5) Gross, J. H.—The diagnostic value of the form and colour fields in hysterical amblyopia. *American Journal of Ophthalmology*, July, 1912.
- (6) Van der Hoeve, J.—The size of the blind spot and its distance from the point of fixation in the emmetropic eye. *Archives of Ophthalmology*, July, 1912.
- (7) Rübel, Eugen.—Enlargement of the blind spot (van der Hoeve's symptom) and central scotoma in disease of the posterior accessory sinuses of the nose. (Vergrößerung des blinden Flecks (van der Hoeves Symptom) und zentrales Skotom bei Erkrankungen der hinteren Nebenhöhlen der Nase.) *Klin. Monatsbl. f. Augenheilkunde*, August, 1912.
- (8) Langenbeck, K.—The forms of the visual field in tabetic atrophy of the optic nerve. (Die Gesichtsfeldformen der tabischen Sehnerven atrophie.) *Klin. Monatsbl. f. Augenheilkunde*, August, 1912.

(1) Schirmer's case is that of a man of 20 years, of rather poor constitution, but with no detectable disease: Wassermann negative, blood pressure normal. He retired to bed at 11 p.m. in good health; at 4 a.m. he awoke with severe headache and noticed a disturbance of vision. This was later found to be due to a complete homonymous hemianopsia. The sudden onset indicated a vascular lesion, and the rapid recession which followed confirmed this view. It was more likely to be hæmorrhage than either embolism or thrombosis, in view of the patient's youth and the normal condition of the heart. The lesion was obviously in the optic tract; that is, at a point where the fibres are still close together. Confirmation of this view is obtained from the fact that the macula was involved, and that hemianopic pupillary reaction was present, the fibres for which leave the tract at its central end, in order to enter the nucleus of the third nerve. The interest of the case lies particularly in the fact that the regression of the symptoms was such as to indicate very clearly the exact site of the lesion. The left field recovered gradually, almost completely, while the right field recovered but slowly and incompletely. According to Bernheimer, the non-crossing fibres lie in the upper part of the tract, and the crossing fibres are beneath these; this arrangement holds good for only a

very short distance behind the chiasm. The lesion must therefore have been in the upper half of the optic tract, on the right side, immediately behind the chiasm, causing more or less destruction of the non-crossed fibres with only pressure effects on the crossed fibres.

ROSA FORD.

(2) **Sattler**, of Königsberg, contributes a useful paper, which is freely illustrated, upon the varieties of fields found in glaucoma, especially in glaucoma simplex. He states that the discoveries of Bjerrum, which have been confirmed by Rönne, by Priestley Smith, and others, have hitherto obtained little recognition in Germany. In fact, much doubt has been thrown upon the value of the comet-shaped enlargement of Mariotte's spot in the diagnosis of glaucoma, especially by Schmidt-Rimpler. The author, working in Professor Krückmann's clinic, has mapped out the fields of a large number of cases, and the typical fields obtained are described and illustrated in his paper. Sattler employed an ordinary perimeter, the patient being placed 35 centimeters away. Small test objects from 1 mm. to 20 mm. in size were used. The author confirms the observations of Bjerrum. The diagrams should be studied by those unacquainted with the types of fields found in chronic glaucoma. They show the typical enlargement of the blind spot, its development into a ring scotoma, the formation of a nasal step, and the extension of this kind of defect into a hemianopic field. The causes of these fields are discussed, and the opinion is expressed that they are the result of lesions in nerve fibres and not in the retina.

T. HARRISON BUTLER.

(3) **Parker**, of New York, describes an interesting case in which the right eye showed loss of vision, optic neuritis, contraction of the peripheral field, and central scotoma. The patient, a medical man, had been subject to pain in the right antrum and muco-purulent discharge. Somewhat later, optic neuritis and central scotoma developed in the left eye, and the right became worse. Sinusitis was suspected: the middle turbinate bones were removed, and the sinuses explored. Pus was evacuated from the left ethmoid and sphenoid cells, and improvement rapidly occurred. Several charts are given to show the changes in the fields with the progress of the case.

A. J. BALLANTYNE.

(4) **Fleischer**, of Tübingen, writes strongly in favour of Bjerrum's method, and expresses surprise that it has not been more generally adopted in Germany. The characteristic feature of the glaucoma field is the presence of a scotoma connected with the blind spot. If the blind spot is normal, glaucoma is not present. Therefore, the blind spot should first be mapped out, after which the object should be carried in a circular manner round the fixation spot, avoiding radial movements in the horizontal meridian.

A. J. BALLANTYNE.

(5) **Gross**, of St. Louis, after some rather discursive remarks on the subject of ocular hysterical manifestations in general, and the views which have been held by various writers, reports and charts the case of an unmarried lady of twenty-two years, of good education and in affluent circumstances, who developed as a symptom, without any ophthalmoscopic appearances, a black spot the size of a pea in the left field, and later on a similar spot in the right field. In the left field the spot was found to be a scotoma for white extending horizontally outward from the blind spot about 20 degrees and having a vertical dimension of ten degrees. In the right field the scotoma could not at first be demonstrated on the perimeter, but was charted at a later date as situated five degrees to the nasal side of the fixation point, slightly oval and covering about five degrees of the arc. Both fields for white were somewhat constricted peripherally, and there was inversion of the fields for red and blue.

ERNEST THOMSON.

(6) **Hoeve** has examined 100 practically normal eyes with a view to discovering the size of the blind spot. Of these, 59 were emmetropic, 3 myopic $\frac{1}{2}$ D., 38 were hypermetropic, not more than 1D. In nearly all eyes the blind spot forms a fairly uniform oval, with its greatest axis vertical. In only one case were the axes oblique. Hoeve calculates from his experiments that the middle point of the blind spot is 4.025mm. horizontally, from the middle point of the fovea and vertically 0.4425mm. that the horizontal diameter of the blind spot measures $5^{\circ} 42' 55''$, the vertical $7^{\circ} 26'$ and it is surrounded by a zone relatively blind for white $1/8^{\circ}$ to $1/4^{\circ}$ and a zone relatively blind for colours, $1/8^{\circ}$ to $3/4^{\circ}$. He therefore concludes that a horizontal diameter of 7° for motion is too large and one over 6° is suspicious. A relative colour scotoma of more than one degree is also suspicious. ROSA FORD.

(7) In the year 1909, van der Hoeve pointed out that enlargement of the blind spot is an early sign of disease of the nasal sinuses, while the central scotoma, which had been previously described, usually occurs at a late stage. The enlargement of the blind spot is first for colours only, then for white, and, at a later stage, meets the central scotoma if one is present. In van der Hoeve's opinion, peripapillary scotoma is a frequent, though not an invariable, occurrence in retrobulbar affections of the optic nerve. It may be an early symptom in toxic amblyopia, and is *usually* an early symptom in diseases of the accessory sinuses of the nose. Improvement occurs a few hours after operation. If, on the contrary, increase in the scotoma is observed, it points probably to blockage of the sinus by the tampon.

Rübel, of Freiburg, gives details of four cases, accompanied by perimetric charts. It is of interest to note that in several of the cases examination of the suspected sinus, at the time of the operation, was negative; but in these, as in the others, the results of operation were favourable. Either the pathological condition was of such a nature as to escape detection, or it must have been of a transient character and already recovering before the sinuses were opened. A. J. BALLANTYNE.

(8) This interesting communication by **Langenbeck**, of Breslau, is based on an analysis of 130 cases of tabes with defects of the visual field. He finds that the cases divide naturally into two groups.—In the first group the affection of the field is a general one. With or without a peripheral defect, there is found to be contraction of the colour fields, or, it may be, complete or partial loss of colour vision, along with a marked loss of visual acuity. It is characteristic of this group that at an early stage the optic nerve becomes affected in its whole cross-section. Eighty-nine of his cases belonged to this group. In the second group the defect of the white field may be sector-shaped or may take the form of extreme concentric contraction, but the colour fields are normal in extent within the preserved area. Central vision may be good, but the prognosis is no better than in the first group. The lesion here is a partial atrophy of the nerve. Twenty-seven of the cases belonged to this group, and in twenty of these there was a sector-shaped defect. The field defect of the second group closely resembles that of glaucoma simplex, but the preponderance of loss in the nasal portion of the field is characteristic of the latter. The author believes that central scotoma is uncommon in tabes. He found it only 14 times in his 130 cases. There were also several cases in which it was believed to be the result of a complicating retro-bulbar neuritis. It is possible to distinguish central scotoma due to tabes from that due to retro-bulbar neuritis. The former is almost always unilateral (10 out of 14 cases), and is associated with peripheral contraction of the field. Further, in tabes the condition goes on to total optic atrophy with amaurosis. In regard to hemianopsia in tabes the author thinks we must still accept the statement

of Leber, that this must be due either to an accidental symmetry in the field defects or to a basal complication.

Rübel's general conclusion is that there is no absolutely typical tabetic field. The commonest form is that in which there is a peripheral defect combined with shrinkage of the colour fields and early loss of red and green vision in the whole field.

A. J. BALLANTYNE.

IV.—TAY-SACHS' DISEASE.

- (1) Turner, J.—Two cases of amaurotic idiocy or Tay-Sachs' disease. *Proceedings Royal Society of Medicine*, February, 1912, and *Brit. Journ. of Children's Diseases*, May, 1912.
- (2) Baidon, Francis J.—Amaurotic family idiocy. *Liverpool Medico-Chirurgical Journal*, July, 1912.

(1) Turner, of Brentwood, Essex, describes, as instances of Tay-Sachs' disease, two cases in children aged five and thirteen years respectively. In both there were points suggestive of syphilis. One of the patients was of Hebrew stock, but the other was not. In neither case was there any history of the disease affecting more than one member of the family, and, more serious still, in neither was the fundus oculi examined with a view to detect the characteristic ophthalmoscopic changes. The diagnosis, in short, was reached apparently on the histological findings alone. SYDNEY STEPHENSON.

(2) The peculiarity of the case reported by Baidon, of Southport, is that twins born of Jewish parents developed the disease towards the end of their first year. A report by R. J. Hamilton, of Liverpool, on the clinical condition of the eyes, accompanies the communication. The malady, which was of characteristic type, ended fatally in twenty-two and twenty-three months respectively. SYDNEY STEPHENSON.

V.—SYMPATHETIC AFFECTIONS.

- (1) Kümmell, R.—Experiments on sympathetic ophthalmia. (Experimentelles zur sympathischen Ophthalmie.) von Graefe's *Archiv f. Ophthalmologie*, Bd. LXXIX, Heft iii, Juli 25, 1911.
- (2) Reis, W.—A criticism of "experimental sympathetic inflammation" (Kritisches ueber "experimentelle sympathisierende Entzündung.") *Klin. Monatsbl. f. Augenheilk.*, November, 1911.
- (3) Deutschmann, F.—On the pathogenesis of sympathetic ophthalmia. Part III. (Zur Pathogenese der sympathischen Ophthalmie, Theil III.) von Graefe's *Archiv f. Ophthalmologie*, Bd. LXXXI, Heft i, Februar 13, 1912.
- (4) Zirm.—Sympathetic disease following extraction of cataract and its treatment with tuberculin. (Sympathische Affektion nach Star-extraktion und Tuberculinbehandlung.) *Archiv f. Ophthalm.*, Band LXXI, Heft iv, S. 314, Juni, 1912.

- (5) **Weekers.**—Pseudo-sympathetic ocular neurosis. (*La névrose oculaire pseudo-sympathique.*) *Archives d'Ophthalmologie*, juillet, 1912.
- (6) **Komoto, J.**—Deafness in sympathetic ophthalmia. (*Ein Beitrag zur Taubheit bei sympathischer Ophthalmie.*) *Klin. Monatsbl. f. Augenheilkunde*, August, 1912.
- (7) **Coppez, V. M. Jean.**—Two new observations on sympathetic ophthalmia. (*Présentation de deux nouvelles observations d'ophtalmie sympathique.*) *La Clinique Ophthalmologique*, 10 septembre, 1912.

(1) **Kümmell**, of Erlangen, reports on the anatomical aspects of his experiments on anaphylaxis as a factor in the production of sympathetic ophthalmia. By the injection of sterilized blood into the vitreous of the rabbit, adhesive iritis could be produced, beginning within eight days, and gradually subsiding within another fortnight. A second similar injection produced a relapse on the next day, and an intravenous injection of serum caused chemosis and fresh exudation into the anterior chamber on the following day. The anatomical appearance in the affected eye was very similar to that of sympathetic ophthalmia. It must also be remembered that Guillery produced anterior uveitis by aseptic ferments (Trypsin, Papayotin, etc.) in a similar manner. Kümmell also refers to Brons, who saw no more marked action from the injection of blood from "sympathised" patients than from normal serum, in contradiction to zur Nedden's different results. The same applies to F. Deutschmann's contribution, the importance of whose anatomical results Kümmell, however, admits. But at the same time he does not think that the implantation of the diseased optic nerve or choroidal emulsion into the eye of the monkey acts in any other way than as alien albuminous matter, the absorption of which causes a deleterious or inflammatory action upon the cells. Something similar seems to take place in the necrosis of intrabulbar tumours and in the disintegration of red blood-corpuscles (E. v. Hippel). Still, this does not explain the anaphylactic agent causing the affection of the second eye. Here Kümmell simply refers, without expressing an independent opinion, to Elschnig's paper, which assumes a somatic anomaly as the active agent. R. GRUBER.

(2) The English title of this abstract does not express the true meaning of the original. The communication by **Reis**, of Bonn, deals with attempts which have been made to set up experimentally the type of inflammation which Fuchs has found to be capable of exciting sympathetic inflammation in the fellow eye. He deals more particularly with the claim of Guillery to have produced, by introducing into the eye ferments free from bacteria, a chronic inflammation of the uvea resembling, both clinically and anatomically, that of the exciting eye (*sympathisierende Entzündung*). According to Reis, the condition produced by Guillery is a septic endophthalmitis, while the changes described by Fuchs are those of a proliferating parenchymatous uveitis. The paper consists chiefly of a close criticism of the histological details furnished by Guillery, and should be read in the original by those interested in the subject. Reis applies a similar criticism to the work of Kümmell, who makes a claim somewhat similar to that of Guillery. He does not believe that the changes produced by these observers sufficiently resemble those found in eyes which have excited sympathetic inflammation to justify the claim that that condition has been artificially produced. A. J. BALLANTYNE.

(3) **F. Deutschmann**, of Hamburg, claims the following results of his experiments.—(1) To have produced genuine sympathetic ophthalmia in the monkey and rabbit by implantation of pieces of choroid from human

sympathizing eyes. (2) To have found a Gram-positive diplococcus, which is perhaps a modified sarcina, capable of producing sympathetic ophthalmia. (3) The affection of the second eye takes place after the bacilli have passed along the lymphatics to the chiasma, and from there down into the orbit. (4) The path of the infection into the optic sheaths is a double one, direct out of the choroid, or first along the anterior ciliary vessels into the orbit, and then through the lymphatics within the external eye muscles towards the optic nerve. (5) The chronic inflammatory changes in the meninges are circumscribed, and do not produce general symptoms.* R. GRUBER.

(4) **Zirm**, of Olmütz, reports the case of a girl of sixteen years who had been blind for two years in the right eye, following the entrance of a piece of glass eight years previously. The patient was anæmic, and in the right eye there was a moderate convergent strabismus with a light grey cataract. There was no perception of light. The left eye was normal. The patient wished the cataract removed for æsthetic reasons. A tenotomy of the right internal rectus was performed, and two weeks later, a simple extraction. The day following, the iris was found prolapsed, and when an iridectomy was performed, profuse bleeding followed. The eye became severely inflamed, and intensely painful, and when about three weeks later, sympathetic trouble developed, enucleation was performed. In spite of various forms of treatment, the sympathetic disease ran a very severe course, until her vision was equal only to counting fingers at one meter. The treatment was now changed to injections of tuberculin, and shortly after, the vision was seen to be improving. This treatment was continued with inunctions, scopolamine, and aspirin until a fairly satisfactory result was obtained. Zirm comments on how suddenly and unexpectedly the sympathetic disease began only twenty-five days after the cataract extraction or twenty-four days after the excision of the iris. On the third day after the appearance of the sympathetic trouble, the offending eye was removed. In spite of this, the inflammation ran the severe course described. Zirm does not believe the original accident had anything to do with the sympathetic disturbance, but thinks the iridectomy was the starting point. He is opposed to extraction without iridectomy and thinks extraction with a semi-dilated pupil with a large conjunctival flap the best procedure. There was no doubt that the disturbance was a sympathetic one, from both the clinical course and from the histological examination of the eye. The case was interesting from the treatment adopted. He resolved to try tuberculin because the physical examination showed some disturbance in the apices of the lungs and because the von Pirquet reaction was positive. The subcutaneous tuberculin test on two occasions was negative. According to the patient, the sight improved considerably after each injection, until at the end of three months, satisfactory vision was obtained.

The peculiar nature of sympathetic ophthalmia is still a mystery. Elschnig supposes a hypersensibility of the second eye, which he explains by an antigen resorption of the uveal tissues caused by tissue degeneration in the uveal tract from inflammation in the injured eye. The hypersensibility of the uveal tract may be more intense in anomalous conditions, such as intestinal auto-intoxication, and metabolic anomalies, congenital and acquired constitutional anomalies. From Bernheimer's and his own case Zirm believes latent tuberculosis may be put in the last group. When sympathetic irritation exists without developing into sympathetic ophthalmia, there is probably an absence in the organism of the anomalous metabolism. Zirm mentions the

*For abstracts of Parts I. and II. of Deutschmann's communication, see THE OPHTHALMOSCOPE, 1911, pp. 864 and 865.

case of a patient who many months after an enucleation following an accident, had marked photophobia, with a moderate venous hyperæmia of the retina. The eyeball was quiet but reddened markedly if pressure were exerted on the normal stump of the enucleated eye, due, Zirm thought, to still-existing sympathetic ciliary irritation. This case is quoted to emphasize his belief in the important relation of ciliary irritation to sympathetic ophthalmia; that sympathetic disease consists in the transmission of the ciliary irritation in an organism where the disordered metabolism products or toxins allow an attacking point.

HANFORD MCKEE.

(5) Under the title of "pseudo-sympathetic ocular neurosis," **Weekers**, of Liège, describes a condition which he considers should be clearly differentiated from true sympathetic ophthalmitis or sympathetic amblyopia. It comprises a class of case in which the symptoms are those of true sympathetic amblyopia, with various symptoms of general neurosis in addition. Treatment directed to the general neurosis is successful in curing the ocular symptoms, irrespective of the presence or absence of the supposed exciting eye. Four detailed cases are related illustrative of the syndrome.

BERNARD CRIDLAND.

(6) Literature contains reports of six cases of sympathetic ophthalmia complicated with deafness of cerebral origin.

In this short paper **Komoto**, of Tokio, contributes an account of another case. The patient, 41 years of age, received an injury to the left eye, resulting in a perforating wound at the limbus and prolapse of the iris. Healing took place with good vision, but about a month after the accident, there was a sudden attack of plastic iridocyclitis, and, a few days later, sympathetic inflammation began in the other eye. This was accompanied by general symptoms, severe headache, and almost complete deafness. The exciting eye was enucleated, and the general symptoms quickly improved. Two months' afterwards, the deafness and visual loss were still unaltered, but it was reported later that the deafness had quite recovered and that the vision had improved to "fingers."

The author points out that in these cases the deafness is certainly cerebral. It is usually bilateral, and equally profound on both sides. As a rule, it comes on without warning, but may be preceded by excessive acuteness of hearing. It may develop with the sympathetic ophthalmia or much later, even months afterwards. The prognosis is bad, but recovery may occur. In one case the deafness came on four weeks after enucleation of the exciting eye. It is difficult to say whether the deafness is favourably influenced by enucleation.

The pathogenesis of the condition may be explained in four different ways, *viz.*: (1) By extension of inflammation *via* the pial sheath of the optic nerve to the geniculate bodies, and thence to the auditory nerve; (2) by a basal meningitis involving the auditory nerve; (3) by metastasis affecting the labyrinth or auditory nerve; and (4) by a toxic affection of the labyrinth or nerve. **Komoto** favours the metastatic theory, and points to the analogous affection of the ear in syphilis and mumps, supposed to be due to inflammation of the labyrinth or auditory nerve of metastatic origin. **A. J. BALLANTYNE.**

(7) There does not seem to be anything very special about the two cases of sympathetic ophthalmia reported by **Jean Coppez**, but the following remark may be transcribed.—"With the ophthalmoscope one could recognise the existence of a papillitis with serous peripapillary suffusion of the most characteristic type. Sympathetic ophthalmia is always seen to commence in this way if one makes the examination at the commencement. Later on, when the disease has reached the anterior parts of the uveal tract, and when the vitreous is muddy, this characteristic early lesion in genuine sympathetic ophthalmia is no longer recognisable."

ERNEST THOMSON.

VI.—ARGYROSIS.

- (1) **Ewing, A. E.**—Argyrosis. *American Journal of Ophthalmology*, April, 1912.
- (2) **Alt, Adolf.**—On a case of argyrosis of the conjunctiva and the staining of the epithelium from the application of an argyrol solution. *American Journal of Ophthalmology*, April, 1912.

(1) In his article on argyrosis **Ewing**, of St. Louis, allows the interesting material, which seems to be the essential basis of what he has to say, to be overshadowed by a considerable amount of writing around familiar topics and by a certain amount of irrelevancy. Surely, it is irrelevant to relate at full length under the title "Argyrosis" the case-history of a patient treated with a silver preparation who *did not* develop argyrosis.

The author has had two opportunities for the examination of argyrosis in fresh tissues—one in sections taken from the orbital region which had been discoloured in the attempt to treat the lacrymal passages with silver, the other in sections from the conjunctiva. Thirteen photomicrographs are reproduced (excellent considering that they are not on a special plate), and these are described, and certain peculiarities in behaviour of the deposit with various chemical reagents discussed.

As regards the conjunctival section, it was found that the epithelium was not pigmented. The vessels and lymph spaces of the papillæ were richly loaded. The blood-vessels entering the papillæ in some places were wholly blackened. Brownish or black granules were distributed throughout the adenoid layer, mingled with brown or blackened elastic fibres. Here and there in the Meibomian glands and in the muscles and fat of the lower lid the pigment was evident, less so in the upper lid, a distribution taken by **Ewing** to mean that gravity had played a part in it.

In the other case, in which the condition really present was a carcinoma and "the lids, inner angle and globe" were excised, sections through the discoloured region in the neighbourhood of the growth, and through the growth itself, showed large and small irregular pigment deposits here and there throughout the connective tissue framework of the carcinoma. Pigment It was also found abundantly in adjacent normal muscle.

Certain interesting points in connection with the nature of the pigment found in the leucocytes in some of the vessels, and with certain peculiar crystals in some of the fat cells must be read in the original.

ERNEST THOMSON.

(2) **Alt**, of St. Louis, who had had the opportunity of studying the cases of argyrosis published by **Ewing** in the same number of the journal, waited for his opportunity to make a study for himself. This he found in a case of severe argyrosis of the conjunctiva following the promiscuous use of various salts of silver.

Alt's object was to discover the effect of a single application of argyrol and to compare it with the older appearances. At least, we conclude the author had that in view, although he does not explicitly say so. Having found a case of argyrosis, he proceeded to apply a more than usually large quantity of a 25 per cent. argyrol solution to the conjunctival sac, and on the following day removed from the middle of the lower retrotarsal fold a piece of conjunctiva for examination. The examination of the sections which were prepared revealed nothing new as regards the older silver deposits. "It simply confirmed what had been found by the previously published examinations."

Among previous observers, none had found any silver in the conjunctival epithelium. In Alt's specimens there was in many places a diffuse brownish colouration which permeated the whole thickness of the epithelium, while in other parts it was located in the more superficial layers, leaving the deeper ones unstained. Even with the highest magnification, this colouration could not be resolved into visible particles. It affected not only the cells but also the cement between them. These brown-stained parts were separated from each other by absolutely unstained parts, showing that the solution had not penetrated uniformly. Here and there very minute blackish granules were found lying in the cement substance, and some smaller and larger blackish particles adhered to the surface of the epithelium. The author concludes that these appearances of the epithelium are the direct result of the application of the argyrol solution the day before. Since argyrol is not caustic and causes no eschar, we are permitted to conclude, he says, that it penetrates the epithelium in this way. The article is illustrated with one photomicrograph.

ERNEST THOMSON.

VII.—OCULAR TORTICOLLIS.

Stephenson, Sydney.—A case of ocular torticollis. *Proceedings of the Royal Society of Medicine*, November, 1912.

The case reported by **Stephenson**, of London, is as follows.—G. C., aged 9½ years, was brought to the Eye Department of Queen's Hospital for Children on August 29, 1912, with the history that she had been treated for



Case of Ocular Torticollis.

some months by electricity for torticollis. The child had constantly carried her head on one side since she was twelve months of age, and the condition had not become worse since then. She had had no illness other than measles at two years of age. She belonged to a family of nine children, of whom one died of pneumonia at three years, one is mentally unsound, and a third suffered from "rheumatism and a bad heart."

On admission.—In the child's habitual attitude the head is inclined towards the right shoulder, forming an angle of about 30° with the vertical. It can be straightened instantly at the child's will. There is no tension on the sternomastoid muscle, no twisting of the head, and little asymmetry of the face, points in which the condition offers an instructive contrast with cases of ordinary surgical torticollis. There is no deformity of the skull. The spinal column is slightly inclined to the left in the cervical region, to the right in the dorsal region, and to the left in the lumbar region. The condition shows the usual accompaniments of a right dorsal curve.

With the head in the abnormal position, the right eye (as shown in the photographs) is usually free from squint, but at other times it is inclined downwards for from 8° to 10° (strabismus deorsumvergens). But as soon as the head is straightened, the right eye squints downwards or the other (left) eye deviates upwards to a corresponding amount (strabismus sursumvergens). The investigation of double images is rendered untrustworthy by the nervousness of the child, but, as far as can be made out, when the head is tilted there is usually no diplopia, and when it is straightened, double images are seen. Apart from the squint the eyes are healthy. Hyperopia, 0.25 D. Right vision, 5/5 (two letters); left vision, 5/6 (two letters). Visual fields for white full in both eyes.

VIII.—CEREBRAL DECOMPRESSION.

- (1) Velter.—Decompression craniectomy in the papillœdema of the syndrome of intracranial hypertension. (*La craniectomie décompressive dans les stases papillaires des syndromes d'hypertension intracranienne.*) *Archives d'Ophthalmologie*, mars, 1911.
- (2) de Schweintiz, G. E.—The relation of cerebral decompression to the relief of the ocular manifestations of increased intracranial tension. *Annals of Ophthalmology*, Vol. XX, April, 1911.
- (3) Lloyd, James Hendrie, and Spellissy, Joseph M.—A case of cerebral decompression of five years' standing, in which a large cerebral hernia has resulted, with marked improvement in optic neuritis. *Journal of Nervous and Mental Disease*, May, 1911.

(1) Advance in cranial surgery, says Velter, of Paris, has placed papillœdema in the position of an affection which can certainly be relieved and in some cases cured. At the hospital of La Salpêtrière, a large number of cases have been trephined for the relief of intracranial hypertension and papillœdema, and a study of these has enabled the author to draw some conclusions with regard to the nature of the condition and its relief by surgical measures. A *résumé* of ten cases, published by various authors since 1902, is given, to which are added details of six others which have come under Velter's personal observation.

His conclusions are as follows:—

1. In the papillœdema of the syndrome of intracranial hypertension, decompressive craniectomy should be performed after mercurial treatment and lumbar puncture have been tried, but there should be no delay if these latter methods do not give an immediate result.

2. The operation must be performed early, as soon as the presence of a progressive papilloedema is noted. The less the visual acuity has been affected the better the result; it is, however, never too late to operate, even in cases of complete blindness, for it is always possible to obtain some improvement.

3. Craniectomy, which may in some cases be an operation of real urgency, should be performed rapidly. The *technique* and instrumentation devised by de Martel appear to offer a guarantee of rapidity and safety.

4. If localising symptoms be present, the trephining should be situated in the region which will later allow of a more complete search for the supposed tumour. If there are no signs of localisation, it is necessary to trephine in the right temporo-parietal or sub-temporal regions. Occipital trephining is the ideal decompressive operation, but beside the difficulties of operating which it presents, there are dangers in cases of bulbar or cerebellar tumour.

5. It is preferable not to incise the dura mater in the first stage. The decompression is usually sufficient and cerebral hernia is avoided. This is no hindrance, however, to an incision at a later stage if the signs of hypertension do not improve.

6. After trephining, morbid symptoms rapidly give way. From the second or third day, the visual acuity undergoes a notable increase, the field enlarges, the papillary oedema diminishes, but the congestion may persist a long time; as a rule, its disappearance is slow, and in the majority of cases the functional state (acuity, visual field) has returned to normal before the fundus has resumed its usual appearance.

7. Complete cure of the stasis can be obtained only in the cases operated on very early. Later, when the papillæ have already begun to atrophy, trephining will arrest the progress of the change, and the visual acuity will remain stationary, but a notable improvement cannot be looked for. In cases of complete blindness, the result is most often *nil*; there are, however, cases in which a certain degree of vision has reappeared.

8. Although decompressive craniectomy is an excellent operation, and can always materially benefit the patient, the operative and visual prognosis vary essentially according to the cases and the cause of the hypertension.

Palliative only in cases operated on late, and where cerebral tumours are concerned, decompressive craniectomy can cure papilloedema if the operation be done early, and if the cause of the syndrome is a serous meningitis or an endymitis, the progress of which is capable of a definite arrest.

BERNARD CRIDLAND.

(2) This excellent article by **de Schweinitz**, of Philadelphia, is the result of personal investigations, and includes a review of the American literature on the subject.

In order to avoid any discussion on the various theories to explain the pathogenesis of intraocular manifestations of intracranial disease, de Schweinitz, draws no distinction between choked disc, from mechanical causes, and optic neuritis, resulting from toxins. He believes, with von Hippel, that such a differentiation is certainly not justified on clinical, and probably not on pathological, grounds.

Palliative trephining or cerebral decompression has been utilised for the cure of choked disc in:—

- (1) Tumours of the cerebrum and cerebellum.
- (2) Various types of brain disease and meningitis.
- (3) Injuries to the skull.
- (4) Syphilis of the brain.
- (5) In renal disease and in some forms of anæmia.

The author personally investigated 75 operations, some radical, some

exploratory, and the largest number decompressive operations. He also made an analysis of 212 operations on the brain, the result of an investigation of the American literature.

As a result of decompression operations, he found that improvement or preservation of sight occurred in 76.5 per cent. of cases, whilst in 23.5 per cent. there was failure to save or to preserve vision.

As regards brain tumours, choked disc occurs in about 80 per cent. of the cases, and "usually the intracranial neoplasm must have existed for some time and the increased intracranial tension have lasted for a definite period, before engorgement-œdema develops" Again, just as it is impossible to predict how soon after the beginning of a growth in the brain choked disc will appear, so also is it impossible to determine with certainty from the stage of the disc or retinal phenomena the duration of the lesion.

de Schweinitz considers that before the appearance of choked disc, there may be some change in the retinal veins or one division of them, in that they become darker, more distended, and more unevenly tortuous and more frequently curved than is normal (resulting from a beginning pressure on the vein from the intervaginal space).

Cushing and Bordley have noted that in cerebral tumour, either with or without choked disc, there may be an alteration in the colour fields, colour inversion (the blue field smaller than the red; hemiachromatopsia, without characteristic change in the form field; islands of blue blindness and blue blindness itself; complete green blindness, and complete achromatopsia). They observe that a decompression operation restores these inverted fields to the normal sequence. de Schweinitz, observes "I am distinctly of the opinion, however, that there is at present no justification in depending on this sign alone as a certain one for recommending a palliative trephining, because even with normal eyes, in many cases of cerebro-spinal disease, and in a number of functional disorders exactly similar visual field phenomena are present."

The author strongly recommends an investigation of the blind spot, even before there are any ophthalmoscopic signs of change in the nerve-head. de Schweinitz has not completed his investigations on this point, but he thinks that scotomata may antedate, sometimes by a considerable period of time, the organic change in the optic nerve.

Another point brought out by the author as an interesting symptom of brain tumour is temporary amaurosis. It depends upon pressure on the chiasma from the third ventricle. Repetition of this symptom, other things being equal, points to the existence of increased intra-cranial pressure, and cerebral decompression should be considered, even in the absence of choked disc.

de Schweinitz recommends that the operation be performed in the early stages whilst the vision is good, and that, in non-syphilitic cases, it is a waste of time to administer iodides and mercurials.

In such cases there is a great chance of the vision being preserved. In the later stages, however, when the process (choked disc) is far advanced, and the visual acuity is poor, or when the field of vision is much contracted (especially if close to the point of fixation), there is often failure to check the degradation of vision and "in a few cases the apparent effect of the operation has been to hasten the onset of the blindness."

As regards the influence of trephining after head injuries, de Schweinitz emphasizes the importance of frequent ophthalmoscopic examination, for should there be development of papillœdema, there is an indication for trephining, even in the absence of any other surgical reason.

A note of warning is given concerning the recognition of the so-called spurious "optic neuritis" usually associated with an error of refraction.

Referring to the greater swelling of the disc being found in the eye homolateral to the tumour, the author states "that this symptom is an important one in association with other signs is not to be doubted, but it certainly is not, by itself, an entirely safe guide."

de Schweinitz considers that in syphilitic papillœdema the anti-syphilitic remedies should be tried for from six to eight weeks, but if the choking of the disc still continues and the vision shows signs of failing, then a simple decompression is the line to pursue. Again, as regards decompression in cases resulting from anæmia, the author would hesitate to recommend the operation unless a long course of iron and arsenic had been tried. He saw only one case of albuminuric neuro-retinitis in which decompression was performed: not by his advice. The result was bad, death following not long after the operation.

JOHN WHARTON.

(3) In the case reported by Lloyd and Spellissy, of Philadelphia, the patient was a married woman, aged 38 years, who had symptoms of rapidly growing brain tumour with a high-grade optic neuritis. In February, 1906, a decompression operation was performed. (No tumour could be found.) Since that time she has been under continuous observation. After the operation, the optic neuritis subsided, and the patient has now a remarkably good condition of her optic nerve, R. V. 4/15 L. V. 4/15, binocularly 4/12, although she remains a bedridden paralytic. de Schweinitz, of Philadelphia, who saw the case at the time of the last note (October 12, 1910), thought the vision surprisingly good, and assumed that the patient was not likely to lose vision from any progress in the eye condition.

ERNEST THOMSON.

IX.—MAGDALENA OPHTHALMIA.

Duran, Cuellar.—The endemic ophthalmia of the basin of the Magdalena (Oftalmia de la Hoya del Magdalena, en Colombia.) *Anales de Oftalmologia*, September, 1910.

The existence of this ophthalmia has been known for a long time to the doctors practising in the region of the Magdalena river. The facts are as follow: in the beginning of winter, there begins to grow a small annual herb, named Chilinchil, belonging to the genus *Cassia*, of the family of the leguminosæ. This is a common weed growing along the roadsides. The root is used as a purgative and the seeds are roasted to make a decoction for some forms of atonic dyspepsia. The flowers are yellow, the petals hooked, and the corolla is irregular. The flowers are inhabited by mosquitoes, whose larvæ develop on the dorsum of the leaves; the adults are capable of only short flight, they have no scales on their wings, and a few straight nervures. They have no biting proboscis, and suck up the ocular secretions. There is a general belief amongst observers that this mosquito is the transmitter of the germ of the disease.

Duran has observed, in the three epidemics of which he has been witness, a well-marked coincidence between the flowering of the Chilinchil, the apparition of the mosquitoes, and the beginning of the disease. It is an obvious fact that the mosquitoes seek the eyes of the affected and unaffected alike. The question of method of carrying the infection is not yet solved; it is doubtful whether the proboscis or the feet are the actual carriers of the micro-organism. Duran inclines to the opinion that the former is the more probable.

It seems certain that the disease is not merely carried by the mosquitoes from a preceding case of purulent ophthalmia ; such cases are very rare except at the time of the epidemics, which occur with regularity. Duran thinks that the microbe is a parasite of the mosquito.

He has been able to reproduce the disease by catching mosquitoes and placing them in the conjunctival sac, both of human and other eyes. Lastly, he has been able, by rooting up the Chilinchil in the neighbourhood of any house, to protect that house from the epidemic. The mosquito is a very weak flyer, and wanders but little way from its chosen home.

The micro-organism of the disease is a diplobacillus very similar in appearance to that described by Morax. HAROLD GRIMSDALE.

X.—CIRCULATORY PHENOMENA.

- (1) **Luedde, W. H.**—Circulatory phenomena in the eye. *American Journal of Ophthalmology*, August, 1912.
- (2) **Hepburn, Malcolm L.**—Inflammatory and vascular diseases of the choroid. *Transactions Ophthalmological Society U.K.*, Fasc. 3, 1912.

(1) The article by **Luedde**, of St. Louis, is interesting and suggestive, although in some respects tantalisingly incomplete. It may conveniently be divided by the reviewer into two portions. The first portion deals with the circulatory phenomena of the choroid and retina—especially the latter ; the second portion with a study of the conjunctival circulation by the aid of the Zeiss-Czapski binocular microscope (corneal microscope).

With regard to the first portion we shall be content to refer to one interesting case related by the author. A woman of twenty years suffered loss of sight in one eye and had been told that this was due to kidney disease. Luedde found diffuse hæmorrhagic areas in the one eye only. There certainly was a large percentage of sugar in the urine and a small amount of albumin. Unilateral headache had been a symptom prior to the loss of vision. Examination by a rhinologist revealed a severe sphenoidal suppuration on the corresponding side. Under treatment of this condition, the eye and the urine both returned to normal. The author explains the presence of sugar in the urine as due to disturbance of the pituitary body by the neighbouring suppurative process.

With the Zeiss-Czapski binocular microscope and improved illumination of his own, Luedde made observations on the conjunctival circulation. The corpuscular movements are plainly visible. The following are some of the facts.—There is great variety of the movements. The velocity of the current in every vessel varies from that in the collateral and anastomosing vessels more or less. Sometimes the corpuscles in the capillaries rest stationary for as long as three or four seconds. The average rate in the capillaries lies between 0.45 and 0.60 mm. per second. Schleich's lowest figure of 0.50 mm. per second is incorrect, since the rate really may go down to 0. As noted by Schleich and others, the vascular system is not full of the blood-elements all the time. In the smaller capillaries the blood may be seen to come along in columns with intervals between. After a drop of adrenalin in the conjunctiva the same thing may occur in a vessel normally three or four times as great. Dionin seems to increase the amount of blood in the tissues along with the well-known lymphædema, but the results with dionin are not yet certain.

In the great majority of cases the flow of blood, with all its stops and hindrances, is in the same general direction in a given vessel and its collaterals, but there are cases in which there is a regurgitant flow which is entirely independent of the pulse-rate. The author has observed this in about a dozen cases among people of different ages and conditions and regards it as a vaso-motor phenomenon due to imperfect peripheral compensation. Some notes of the cases are given. For example, in one there was swelling of the ankles without anything definite being found wrong. Another was a man of 23 years who fainted in the doctor's office. A third was a hysterical woman examined after a spell of vomiting induced by reflection of light into the eyes from the ophthalmoscope. Several experiences have led the author to think that this condition may be present in normal individuals when very tired.

Another point about this method is that it may be of medico-legal use in confirming the total cessation of all movement of the blood stream in cases where the question of "suspended animation" or actual death needs to be decided.

Lastly, by means of this instrument we are able to see miliary aneurisms, long before they break down, and so to diagnose arterio-sclerosis at an early date.

ERNEST THOMSON.

(2) The article by **Hepburn**, of London, illustrated with diagrams, charts of the visual fields, and fundus drawings and furnished with a bibliography, is of such interest that we transcribe the author's summary verbatim.

1. The clinical features shown in cases of inflammatory and vascular disease of the choroid furnish supplementary evidence in favour of the view, expressed in the *Royal London Ophthalmic Hospital Reports*, vol. XVIII, Part I, 1910, that the choroidal circulation is of the nature of a terminal vascular system and is divided into three main groups, *viz.*, the macula, mid-periphery, and extreme periphery.

2. Starting from this anatomical standpoint, inflammatory diseases of the choroid can be divided into five varieties.

- (a) Disseminated choroiditis.
- (b) Diffuse choroiditis.
- (c) Deep localised choroiditis.
- (d) Superficial localised choroiditis.
- (e) Macula choroiditis.

3. The chief differences between the deep and superficial localised choroiditis are that in the latter the inflammatory patch has a well-defined pigmented edge, much pigment proliferation over the surface, most of which is retinal, the deep vessels are seen unharmed crossing the floor of the atrophic area, the scotomata in the field of vision accurately correspond to the shape, size, and position of the inflammatory focus; whereas in the former there is little pigment proliferation on the surface, though the border is fairly well defined; there is often a good deal of fibrous tissue change, and deep vessels are never seen crossing the floor of the patch, while the scotoma in the visual field takes the form of a wedge-shaped defect extending outwards into the extreme periphery, though actually over the affected area the retina retains its function or the visual acuity is only relatively lowered. Moreover, the superficial variety is often only discovered by accident, and clears up in a few weeks after the acute stage has begun to pass off, but the deep takes many months or even years to quiet down, and there is generally a history of sudden onset.

4. There is a good deal of evidence to show that diseases of the choroid are very localised in the macula region, and usually assume a definitely circular shape, most marked in the initial stages; subsequently, if the

inflammatory reaction is excessive there is some overflow of exudation into the surrounding parts constituting the condition known as retinitis circinata; this undergoes fibrous degeneration or becomes partially, perhaps even completely, absorbed, so that in some cases a complete ring, and in others a partial one is seen encircling the central macula disturbance.

5. The commonly accepted view to explain the sector-like defects in the visual field is the destruction of the nerve-fibres at the point where the inflammatory focus occurs, and thus the cutting off of the peripheral nerve supply of the retina. If this were so we should expect the size of the wedged-shape defect to vary, being greater the nearer the disc the inflammation occurs, and also similarly shaped scotomata ought to occur in the superficial variety; this, however, is not the case.

Pigmentary degeneration might be expected to appear in the extreme periphery if the blood current be obstructed in the vessel supplying that region; this has not been seen in any case, but the retina appears normal over the part which has lost its function. On the other hand, it is possible that the part of the fundus supplied by the extreme peripheral branches of the choroidal circulation is not visible with the ophthalmoscope.

6. Vascular diseases of the choroid may be divided into four varieties:

(a) Disease of the chorio-capillaris, leading to primary pigmentary degeneration of the retina, beginning first in the mid-peripheral set of vessels later attacking the extreme periphery, and finally the macula.

(b) Hæmorrhages.

(c) Innocent emboli and thrombi, examples of such often giving the appearance of so-called coloboma of the macula.

(d) Degenerations, such as Tay's choroiditis, due to slighter and more superficial changes in the vessel walls.

XI.—PARINAUD'S CONJUNCTIVITIS.

Rosenhauch.—On so-called Parinaud's conjunctivitis. (Ueber die sogen. Conjunctivitis Parinaudi.) *Archiv. für Augenheilk.*, Band LXXII, Heft ii, S. 162.

In February, 1899, Parinaud reported three cases of a peculiar form of conjunctivitis (infectious conjunctivitis transmitted by animals). The course of the disease was as follows.—It occurred among persons having to do with cattle, and after a period of general *malaise*, often with fever, the lids of one eye and the scleral conjunctiva became swollen, with a purulent discharge. At different points in the conjunctiva there developed large papillary growths and follicular nodes. These nodes, at the outset, were half-transparent. There were also smaller abscess formations (Despagnet). A remarkable symptom was the swelling of the lymph glands in the preauricular and submaxillary regions, sometimes followed by suppuration. The disease was nearly always one-sided, extended over some months, and healed without leaving any trace. An involvement of the cornea was not observed.

Since Parinaud's description the disease has been reported from many sources. All agreed with Parinaud that the most important symptoms are one-sided conjunctival granulations, with simultaneous swelling of the preauricular and submaxillary glands of the attacked side. Different writers have varied as regards the size, number, and appearance of the granulations. No one has as yet been able to settle the question of ætiology of this peculiar inflammation.

Bacteriological examination has not given any definite results. Generally, white staphylococci and the bacillus xerosis were found. Kyle and Rosenhauch reported a streptococcus finding; Wylie the pneumococcus; and Scholtz, a bacillus which resembled the organism of cholera, and which was pathogenic for mice and hens. Parinaud thought the cause was an undescribed micro-organism, which came from stable animals, and he named the horse as the host of the most dangerous form.

The pathological examination has not helped in the explanation. There was found in the conjunctival epithelium, mucinous degeneration, subepithelial infiltration, with plasma cells, and follicle formations; cell necrosis in the subconjunctival tissues, and infiltration with lymphoid phagocytic cells. Hoor found a tuberculous-like formation, but could not demonstrate bacilli, and his animal experiments were negative. From his observation he did not believe in a possible connection between Parinaud's conjunctivitis and tuberculosis of the conjunctiva. His observations, however, brought this subject into prominence, and Wessely at the thirty-sixth meeting of the Ophthalmological Society at Heidelberg in 1910, described the case of a butcher's boy who was ill with what was clinically a typical Parinaud's conjunctivitis. Inoculation of monkeys with the diseased gland tissue set up tuberculosis, which was shown to be of the bovine type. This explanation of Wessely's was confirmed by the clinical experience of Schreiber, Brückner, Wagenmann, and Siegrist. At about the same time Verwey reported the examination of tissue and positive results from monkey inoculation. He believed the two diseases to be identical. In August, 1911, the work of Krusius and Clausen appeared. They described two cases. In the second, the Parinaud conjunctivitis developed on top of a phlyctenular inflammation. In both cases the von Pirquet cutaneous reaction and the subcutaneous injection gave positive results. Further, the inoculation of guinea pigs confirmed the opinion of the writers, namely, that the disease was due to infection with tubercle bacilli.

Wicherkiewicz drew **Rosenhauch's** attention to the fact that trachoma, in special form, may appear like Parinaud's conjunctivitis, and that a thorough examination as to whether Parinaud's conjunctivitis was always one-sided or not, might repay one. With this idea in mind, Rosenhauch examined very carefully, four cases the facts of which he gives in detail.

CASE 1.—K. M., aged 33 years, complained of having had a sore eye for a period of two years. No history of tuberculosis or syphilis. Examination showed severe swelling of the right preauricular gland; slight mucopurulent discharge. On the upper fornix of the right eye there were large greyish-red granulations. The cornea was clear. The left eye normal, apart from a slight hypertrophy of the papillæ. The Moro tuberculous reaction was positive; the Wassermann, negative. Examination of the tissue and inoculation of guinea pigs gave the diagnosis of tuberculosis of the conjunctiva.

CASE 2.—B. F., 14 years old. For one year the right eye was reddened and painful. No association with animals, no history of tuberculosis or syphilis. The right preauricular gland was swollen, the lids of the right eye were cedematous. On the upper and lower fornices were granulations which extended to the lid margin. Left eye was normal. No trachoma-bodies were found. Histological examination and inoculation of animals gave the diagnosis, as in Case 1, of tuberculosis of the conjunctiva.

CASE 3.—K. B., 16 years old, complained that her left eye had been watery and inflamed, with swollen lids for five days. No history of tuberculosis or association with animals. Examination showed severe swelling of the left preauricular glands, swollen lids, with moderate mucopurulent discharge. The whole conjunctiva cedematous, and covered with granulations. The right eye was normal. The Moro reaction for tuberculosis was negative. Bacteriological examination revealed no trachoma bodies, but a large number of pneumococci. Diagnosis, acute follicular conjunctivitis, from pneumococcus infection.

CASE 4.—K. M., age 23 years, complained that for six days, right eye had been red, painful, and discharging. No history of tuberculosis or previous disease of the eyes. With this attack there has been a general feeling of *malaise*. Examination showed right preauricular and submaxillary glands swollen and painful. The eyelids of right eye swollen, with mucopurulent discharge. The whole conjunctiva of the lower lid was covered with greenish-yellow transparent granulations of different form and size. The conjunctiva of the upper lid showed distinct papillary hypertrophy. Lids of left eye were normal, preauricular gland was enlarged, and on the tarsal conjunctiva there was papillary hypertrophy. With treatment by cold compresses, the acute symptoms moderated so that after three

weeks, the swelling of the lids and lymph glands and discharge had disappeared. There remained moderate papillary swelling, small granulations, and scars. The Moro reaction was negative. Bacteriologically were found numerous Koch-Weeks' bacilli; no trachoma bodies. The histological examination showed tissue with a tuberculous structure, with large collections of small-celled infiltrations. Inoculation of a small piece of tissue into the anterior chamber of a guinea pig produced only a moderate reaction, which disappeared in a few days. Diagnosis, acute granular conjunctivitis.

These cases, writes Rosenhauch, all showed the clinical symptoms of Parinaud's conjunctivitis—one-sided appearance, swelling of lids and of the lymph glands, and granulations. These are the signs which characterize this disease. If one adds the possibility of transmission by animals, rise in temperature, and general *malaise*, then one has a description corresponding entirely with that given originally by Parinaud. The symptoms in these cases were very similar, but how different the ætiology. In case No. 4, some of the examiners could not discern the slight papillary hypertrophy in the supposedly healthy eye. Only thorough examination with the *loupe* by Professor Wicherkiewicz disclosed small follicles and cicatrices. This led to the diagnosis of trachoma, which was confirmed by the course of the disease. Whilst the ætiology of Parinaud's conjunctivitis and its relation to tuberculosis are still debatable. Rosenhauch wishes to demonstrate with the four reported cases, that clinical symptoms resembling so-called Parinaud's conjunctivitis may have very different causes; that at present we are giving the name of Parinaud's conjunctivitis to a disease not yet thoroughly examined or explained; and that this name is being given to a symptom-complex, which future examination will perhaps separate into ætiologically different diseases.

HANFORD MCKEE.

BOOK NOTICES.

Studies in Clinical Medicine. By C. O. HAWTHORNE, M.D. London John Bale, Sons, & Danielsson. Pp. 441. 1912. Price 6s.

As the author states in the preface, many of the essays and lectures which comprise this volume have already been published elsewhere in current medical literature. The subjects dealt with are numerous, and cover a wide field. The chapter dealing with the clinical significance of double optic neuritis in children and young adults, and the capacity for recovery from symptoms of brain tumour, published originally in the *Glasgow Hospital Reports*, 1900, must be familiar to all those interested in ophthalmology and neurology. The writer strongly insists on the early and constant use of the ophthalmoscope in every case of persistent and obscure headache, whatever the age of the patient. As at the present day, there can be no question that in a case of progressive papillitis, a decompressive operation will preserve useful vision, whether it be possible or not to localise the intracranial lesion which is supposed to exist, the constant use of the ophthalmoscope is the best guide to the progress of the case, and the result that is likely to be obtained by expectant treatment. A good bibliography is appended, but one could wish that some of the more important papers published during the last few years had been included.

As is well known, the writer is a strong advocate of the opinion that thrombosis affords an adequate explanation of certain cerebral and ocular manifestations of anæmia. The cases he refers to are by no means infrequent. Such patients do not always present well-marked evidence of anæmia, as judged by the blood count. It is important to recognise

this syndrome : headache, vomiting, bilateral papillitis, usually of a low grade, with or without paresis of a rectus muscle, occurring in young women especially who present, without any evidence of renal disease, a moderate grade of anæmia of the chlorotic type. The result, if suitable treatment, apart from operative interference, is adopted, is so frequently good that a hopeful prognosis at the outset is sometimes justified. Whilst it is impossible to exclude thrombosis as a cause, the existence of a tumour, in view of the large percentage of recoveries, seems also highly improbable. The details of two cases of retinal embolism are related, in which a normal standard of central visual acuity was retained. The explanation was apparent. The ophthalmoscope revealed cilio-retinal vessels which were not only unusually well developed, but were intimately related to the macula.

The author relates three cases of malignant disease with cerebral metastases. In one, malignant disease of the lower bowel was followed by right homonymous diplopia. The chapters on arterial blood pressure should be read by those interested in this subject. The writer makes a strong plea for the combined use of the sphygmomanometer and the sphygmograph.

In the chapters dealing with the eye symptoms of tabes, the author once more strongly insists on the great value of including an examination of the pupils in the systematic and routine examination of every patient. The thirty cases quoted appear to substantiate the well-known fact that primary atrophy, ocular paralysis, and Argyll Robertson pupil may (a) precede by many years, in some cases, the onset of spinal symptoms and signs; or, (b) may be the sole evidence of the disease. Only by a routine examination of the pupils can we expect to detect the Argyll Robertson phenomenon which may presumably remain latent for a long period prior to the time the patient seeks advice. In another essay the significance of unequal pupils is touched upon. Unilateral diabetic neuritis is rare. The case of a female patient, aged 67, in whom renal disease could be excluded, is detailed. This patient also suffered from paralysis of the external rectus muscle, a still rarer complication of diabetes. The paralysis eventually cleared up under observation. The knee-jerks were absent, and there was a history of two attacks of severe bilateral sciatica. The cerebral, spinal, and peripheral lesions of the nervous system met with in diabetes are referred to shortly. To the chapter on secondary parotitis, a comprehensive literature is appended. The author has made a special study of the relation of subcutaneous nodules to rheumatism and rheumatoid arthritis, and the chapters relating to this subject, in addition to containing the more important references to the matter, are also beautifully illustrated.

The volume also contains clinical lectures, for the most part already published elsewhere, on functional hemiplegia, infective endocarditis, pernicious anæmia, carcinoma of the liver, pyopneumothorax associated with gangrene of the lung, renal disease with retinitis, the secondary inflammations of renal disease, peripheral neuritis with œdema, syphilis in married women, and tabes dorsalis. The last-named includes an account of two female cases and one juvenile one.

SYDNEY A. OWEN.

Diseases of the Eyes. By C. DEVEREUX MARSHALL. London : University of London Press : Hodder and Stoughton, and Henry Frowde. 1912. Price, 10s. 6d.

The last volume of the London Medical Publications can only be regarded as a worthy addition to the series of concise manuals for students which are being published by the University of London Press.

It is exceedingly difficult to condense the immense amount of fact concerning modern ophthalmology into a small volume of 300 pages, and it is a thankless task to write to order and within a given time, but the author has succeeded in producing a book which exactly fulfils its object. Mr. Marshall's work is certainly the best small book we know to place in the hands of the ophthalmic dresser. The author has jettisoned much that is merely of historic interest, and has presented to the reader an account of the most modern practice in the surgery of the eye.

The book is so good that we feel sure that the author will forgive us if we offer in a very friendly spirit the few criticisms which have occurred to us in carefully reading *Diseases of the Eye*.—In the preface he tells us that in such a small volume he has been compelled to be dogmatic, but we feel that in some places dogmatism has almost passed into slight inaccuracy. He informs us in the preface that there can be no question of the truth of the Edridge-Green theory of colour perception. As a matter of fact, the theory, although almost certainly the very best working hypothesis, has, up to the present, received very little recognition, and is not even mentioned in the most recent German text-books.

We can scarcely agree that it is best to register in the patient's notes an uncorrected retinoscopy, because a corrected one might confuse any one reading the notes. An uncorrected retinoscopy means little unless the working distance be stated. It is better to record a corrected retinoscopy, or to register it as an uncorrected one at one metre, or two, as the case may be.

Our experience with trichiasis operations has been an extensive one, and we have found the Jaesche-Arlt operation, which the author highly recommends, to be very unsatisfactory. The cases nearly all relapse. Similarly, Burrow's operation, which is praised, is certainly the worst of all. Snellen's operation, which is in many cases an excellent procedure, is not even mentioned.

During a long residence in the East we never saw the extensive corneal ulcers which the author describes as frequently associated with pannus. Small pinhead-size ulcers are frequently observed at the advancing edge of the pannus; a large one is present only when there is a mixed infection and a muco-purulent conjunctivitis. Nor can we agree that the diagnosis of trachoma is easy: in slight cases it is excessively difficult, often quite impossible at first.

The most common cause of orbital suppuration is extension from a nasal sinusitis, not from a dacryoadenitis, as Marshall suggests.

On page 121 it is stated that the most obvious treatment of syphilitic interstitial keratitis is to administer mercury; it is the most obvious, but Holmes Spicer and others have shown that it does no good, and only perhaps lessens the frequency of deafness. Our own experience fully confirms this view.

It is too absolute to state, as the author does on page 144, that increased tension in an eye is *always* due to closure of the angle of the anterior chamber; it would be more correct to use the word "generally."

The very favourable results of *early* enucleation of an eyeball containing a tumour are not insisted upon; we feel that the author takes rather a pessimistic view of intraocular growths. Some surgeons claim 100 per cent. of recoveries in these cases, and up to the present we have ourselves never seen a recurrence when the eye has been removed before the nerve has become involved, and before perforation has taken place.

On page 171, we are told that there is "practically no danger" of iris-prolapse in the combined operations of cataract extraction. The exact figures are from 3 to 5 per cent.

The ætiology of episcleritis is not so obscure as Marshall would have us believe. Verhoeff and others have proved that the vast majority of these cases are tuberculous in nature. The author has, we fear, hardly grasped the true rôle played by the tubercle bacillus in diseases of the uvea. The teaching of von Michel, Stephenson, Verhoeff, and others makes very slow headway.

On page 204 the evil effect of electric light is scouted; but surely the modern metallic filament emits ultra-violet rays to an injurious extent, and such light, if prolonged, has a very deleterious effect upon the conjunctiva.

On page 210 we find that Leslie Paton's views regarding the ipso-laterality of optic neuritis and cerebral tumour are not quite correctly stated. In his paper he says that the condition of the discs gives no trustworthy information as to whether the tumour is ipsilateral or not. He does not state, as Marshall imagines, that the optic neuritis is most intense on the side opposite to the tumour.

Day blindness, one of the most constant symptoms of tobacco amblyopia, is not mentioned at all.

In dealing with exostosis of the orbit, the author does not state that they generally, if not always, originate from a nasal sinus and should be attacked from within the sinus after careful X-ray examination.

The author is exceedingly fond of using a Graefe knife in performing iridectomy in glaucoma. The keratome is used far more frequently all the world over outside London. Large doses of salicylates have proved very valuable in sympathetic ophthalmia, but this fact is not mentioned.

Apart from these trivial criticisms, we have nothing but praise for the book. We regard the chapter on colour blindness as the best that has been written on the subject. The chapter on refraction, too, should be taken to heart by all students. The science of refraction is based on retinoscopy. One who is a poor retinoscopist cannot refract.

In a future edition some errors of diction might be corrected, and we would suggest that miosis is derived from *μείωσις* and should never be spelt "myosis."

We congratulate Mr. Devereux Marshall upon his book, which we hope will soon be in the hands of every student. T. HARRISON BUTLER.

Transactions of the American Ophthalmological Society. Vol. XIII, Part I, 1912.

The *Transactions of the American Ophthalmological Society* contains an account of the proceedings at the forty-eighth meeting of the Society, held in June last, at Atlantic City, N.Y. It is illustrated.

The Anatomy of the Human Eye, as illustrated by enlarged Stereoscopic Photographs. By ARTHUR THOMSON, Professor of Human Anatomy in the University of Oxford. Oxford: The Clarendon Press. 1912. Price £2 2s.

Professor Arthur Thomson has departed from the ordinary track of book writers in that he has aimed, not at the written description of the gross anatomy of the structure, but at the production of a series of plates which shall show to the student of the anatomy of the eye of man all that the unaided eye can see. To this series of plates is appended a book of description, which is more a dissector's guide than a text-book of anatomy, and, in addition, a series of woodcuts with lettering which enables the user of the work to follow what he sees, or should see, in the plates by the aid of diagrams.

The plates are excellently executed (and reproduced) stereo-photograms of parts of the human eye, so dissected and arranged as to show to the greatest advantage certain points in the anatomy of the organ which are not easily understood unless an actual specimen be held at the moment.

Thus it will be understood that Professor Thomson's book is really a box of stereoscopic pictures, sixty-seven in number, accompanied by a book of sixty-one pages of letterpress description of the anatomical structures seen by the unaided eye, and sixty-seven woodcuts, lettered and with reference description of greater or less length. To this is added an index which enables the student to find in a few moments any point to which he may be anxious to refer.

To one who does not know from practical experience how difficult a thing it is to photograph, in a satisfactory manner, the bisected eye, it may seem that there is nothing very wonderful about the plates which our author gives us, but to one who has tried (and failed) the beauties will be at once apparent. The difficulties of illumination are great, and they have been well overcome—in many cases wonderfully well overcome. In a few plates there is still a snowy whiteness where reflected light shines unpleasantly and unnaturally, but in most the result is perfect.

It may be mentioned, as our author takes pains to impress upon us, that the plates are so shaped as to fit perfectly the holder of any of the ordinary stereoscopes to be purchased for a small sum at most opticians.

Professor Thomson does not explain, either in his preface or in his introduction, to whom in particular his work is addressed—whether to students of anatomy, to medical practitioners in general, or to ophthalmologists in particular, and it is presumed that all are to find it, as they surely will if they use it properly, useful and instructive. It is, however, to be remembered that the work deals with gross anatomy, not microscopic anatomy, and that it is to be regarded only as an aid to the comprehension of the precise relationship of parts in an organ which it is not given to all to see in the fresh condition.

If this be understood to be what Professor Thomson aims at, he is to be congratulated on producing a work which will undoubtedly simplify both teaching and learning, and we feel sure that all educational centres will benefit by having this new work at the disposal of the students.

There may be points in which this work might be improved, but they are usually of so contentious a nature that the individual opinion is of unusual value. For instance, the writer of the letterpress adheres to the view that the membrane of Descemet breaks up towards the margin of the cornea and goes to form the meshwork in which the spaces of Fontana are situated, whereas some proof can be adduced to show that the membrane of Descemet ends almost abruptly before the meshwork begins. Again, the writer states very definitely that none of the fibres of the meridional portion of the ciliary muscle pass "in front or over the summit of the scleral process" (page 18). Now, it is to be feared that the reproduction of a photomicrogram opposite page 17, although excellent in many respects, has been "touched up" to accentuate both ciliary muscle and scleral process, and the result is that, although the above statement is proved by the photomicrogram, it is not proved for all photomicrograms and is open to contradiction. We fix upon these two little points because this part of the eye is so strongly under the limelight at present, in view of its influence in the production of glaucoma, that no trifle may be left to one side. Further, the vexed question of the mechanism of accommodation must be considered in relation to this part of the eye, especially as we have lately had a paper from the same author in THE

OPHTHALMOSCOPE which touches both subjects very closely, and an allusion is made in the present work (p. 18) to the same subject.*

There are one or two really minor points to which one may fairly allude as doubtful. On page 13 it is stated that the fibres of the meridional portion of the ciliary muscle pass back and become "lost in the substance of the ciliary processes," etc. It must be but very rarely that it is possible to trace muscle fibres from the ciliary muscle into the ciliary processes, since in, at all events, the vast majority of instances, the muscle is clearly delimited at its posterior border.

On page 33, after remarking upon the ridge of iris which lies (in some cases) some little distance from the pupillary margin, the writer notes that this is the remains of the ridge to which the pupillary membrane was formerly attached. He then remarks of the so-called *pupillary stomata*, that they lie to the "inner side of this attachment, and thus provision is made whereby filtration of the contents of the posterior camera of the aqueous chamber may take place prior to the opening up of the communication through the pupil with the anterior chamber." This statement requires some elucidation both as to why such a communication should be required at such an early stage of foetal life, and as to how it could be established by stomata in the iris. It may practically be taken for granted that prior to the removal of the pupillary membrane there is no anterior chamber, as the iris lies in contact with the cornea until quite a late stage of development has been reached. By the time the iris is fully developed, the provisional pupillary membrane is becoming absorbed, and communication through the pupil can easily be established.

There is one other point to which it seems proper to allude, namely, the appearance of the optic nerve entrance (optic papilla) in plates 58 to 60 inclusive. All seem to be in a condition of œdema, which completely masks the natural appearances.

It is a trifle difficult to know what is the best way to use this work, whether to begin with the plates and then to take up the text, or *vice versa*. To try to keep both going concurrently, as it were, is a somewhat irksome process. A few words of direction from the author to a student studying the subject for the first time might be of advantage.

Professor Thomson's work represents a great deal of time and a vast expenditure of energy, and the author is to be congratulated heartily upon its execution.

LESLIE BUCHANAN.

Miners' Nystagmus. (*Das Augenzittern der Bergleute.*) By JOHANNES OHM. Leipzig: Verlag von Wilhelm Englemann. 1912. Price M. 2.40.

This little book is a notable addition to the literature dealing with miners, nystagmus, and since it adduces some new facts and contains valuable statistics, we may review it at some length.

Although it is an excellent work, it approaches the subject more in a scientific and scholastic spirit than from the practical standpoint. The atmosphere is rather that of the consulting-room and the laboratory than of the coal mine itself. The arrangement, too, is bad, and it is necessary to read the whole book to collect the main facts concerning the disease, its symptoms, causes, and treatment. A summary would render the book more valuable. It is, however, a work that no one interested in the disease can afford to disregard; it shows evidence of plodding research and careful observation. The author

* See THE OPHTHALMOSCOPE, Vol IX, No. 7, July, 1911, Prof. A. Thomson.

agrees that the disease is confined to the colliery, and, with a few words, brushes aside Snell's attempts to prove the opposite. He finds that in his neighbourhood (Bottrop in Westphalia), 3.3 per cent. of the miners suffer from the disease. This means that at least 11,500 miners are affected in this district alone. These figures are gained from the examination of *all* miners who consulted Ohm, and are not the result of examination in the mines themselves. They have, therefore, no real value. Ohm finds that the sufferers are, in general, healthy, normal men. He does not think that nystagmus is apt to be associated with other diseases, such as anæmia. He agrees with Snell that nystagmus is occasionally a familial disease. We have ourselves seen this.

A table is given showing the percentages of sufferers at different ages: 27 per cent. of Ohm's cases were found between the ages of 30 and 35, 66.4 per cent. between 25 and 40. The question as to whether errors of refraction influence the onset of the disease is not considered, but the refraction in 389 cases is given in the following table:

Emmetropia	...	...	...	...	28.7 per cent.
Hyperopia including astigmatia				...	40.1 per cent.
Myopia	"	"		...	19.7 "
Anisometropia	"	"		...	11.3 "

These figures give some support to those who contend that ametropia is an important factor in the ætiology of the disease. The amount of ametropia is not stated.

The author has not detected any contraction of the field of vision when the eyes are examined during periods of rest.

Regarding the much debated question, "Is hemeralopia a symptom of the disease?" Ohm has nothing to say. He quotes Wecker's work upon the dark adaptation of miners, but says that he himself does not possess the necessary apparatus to decide the question. The complaints of the miners upon this symptom are not mentioned.

The recommendation, that in doubtful cases of nystagmus the ophthalmoscopic image of the disc should be observed, is an excellent one, and we have, since reading the book, practised the method with great benefit.

The nature of the nystagmus is very important, and has not received sufficient attention. It is neither a "*nystagmus à pendule*" nor "*à ressort*," but an *undulatory* nystagmus (*Wellenförmiger*). In their classical form the oscillations are quite regular. They fall into two groups: the rectilinear and the circular or elliptical. In some cases, however, the movements are irregular. The amplitude of the oscillations varies within wide limits, and the same is true of the speed, which varies from 60 a minute to over 200. Romiée's figure of 500 is probably exaggerated. In some cases the nystagmus is constant, in others there are periods of rest. Many men complain of the subjective symptoms, but no nystagmus can be detected. Such men should be examined more than once. Certain points require attention if a definite diagnosis be desired. Fatigue plays an important part. Nystagmus tends to be less after rest, and to increase after hard work. For this reason, in a doubtful case, it is best to examine the miner as soon as possible after he has left the mine. Illumination is of importance: in the dark, nystagmus is worse than by daylight. Many cases in which no nystagmus can be detected show it at once when the room is darkened. It often appears after the patient has bent up and down two or three times. The influence of alcohol must never be neglected. A dose of alcohol of sufficient strength will almost always abolish nystagmus, a fact which may lead to error in diagnosis.

The author devotes several pages to a careful description of the various kinds of nystagmus. He has invented a binocular ophthalmoscope, which

enables both optic discs to be brought into the same field close together. Observations with this ingenious instrument have shown that in most cases of vertical nystagmus when one eye moves up, the other moves down. In horizontal nystagmus the movements are those of divergence and convergence. These facts have an important bearing upon the theory of the disease, pointing to the view that the lesion is a central one situated in the oculo-motor nucleus. In exceptional cases only are the oscillations of a different nature in each eye, and occasionally the nystagmus is confined to one eye.

Nystagmus is often associated with other defects in the oculo-motor mechanism. In some cases when the patient looks up, cramp of the interni is observed and the pupil contracts. The result is a convergent strabismus and miosis. Spasm of accommodation may sometimes be detected. Movements of the head may be present which have been said to be compensatory to the nystagmus. Ohm believes they have nothing to do with the nystagmus, but are due to alcoholic excess. We can only suggest that he is in error in this view. We recently examined a miner who volunteered the information that when his lateral nystagmus first started he was compelled to move his head in unison with the oscillations of his eyes to get a clear view of any object. The twitchings of the neck muscles seen in these cases have nothing in common with alcoholic tremors.

Ohm finds that lid twitching is common. In some cases there is, he says, marked antagonism between the lid twitching and the nystagmus. In many examples of severe lid twitching there is only slight nystagmus, or it may even be absent at times. Alcohol, which inhibits the nystagmus, increases the lid twitching. Lid twitching is often exceedingly persistent. Ohm cites a case in which it lasted for three years. In one case instillation of cocaine cured it. The author regards this symptom as compensatory to the nystagmus; the two phenomena antagonise each other; those patients with the worst lid twitching have little or even no nystagmus, and *vice versa*. Our own observations confirm this view of Ohm's. The author does not believe that accidents have any influence upon nystagmus, except in so far as nystagmic miners see badly and are more liable to accident.

Ohm finds (and most observers will agree with him) that when a miner has been cured by rest and by work outside the mine and then returns to work, he is almost certain to relapse, and the relapse is worse than the original attack. He omits, however, to state that such a man may return to work in a candle mine and remain free from the disease. He insists that if we wish to cure a case of nystagmus the patient must leave the mine.

Tables are given showing the incidence of nystagmus among the various grades of miners. No class is free from the disease, but it is more advanced among the older colliers, men who have worked long enough underground to become "holers" and "stallmen." The "stallmen" are much affected because they are senior men in the mine, not because of the nature of their work. The exact figures are: Junior men—assistants, men who wheel trucks, etc., 13·8 per cent; "Holders" and "stallmen," 68·7 per cent.; Officials, 4·1 per cent.

Ohm believes that the disease is of central origin, due to functional derangements in the oculo-motor nucleus. The cause is fatigue of the nervous elements. He critically discusses all the hypotheses which have been advanced. He admits that defective illumination is one of the factors, but does not attach sufficient importance to it. He has not explained the fact that nystagmus is practically absent in candle mines, even when the seam is very thin and the men have to work in very constrained attitudes, and that it

is quite common in lamp mines with a thick seam, where the men work standing up, and there is no evidence of any muscular strain. He finds that exophoria is very common, and recommends advancement of the interni as a cure for the disease. He has adopted this procedure in three cases, and believes it has done a certain amount of good.

No one working at miners' nystagmus can afford to neglect Ohm's valuable book. We regret that it is somewhat badly arranged and involved, and that little stress is laid upon the history the miners give of their own symptoms. In spite of these faults, the work is one of the best which has been written upon the subject.

T. HARRISON BUTLER.

NOTES AND ECHOES.

Deaths.

DR. PHILIP STEFFAN, one of the old guard, died at Marburg recently in his 75th year. Steffan was a pupil of Arlt in Vienna. He then settled at Frankfurt a.M. as an ophthalmic surgeon, and for upwards of forty years enjoyed a very large practice.

With regret we note the death of Dr. Lynn R. Graddy, formerly professor of ophthalmology and diseases of the ear and throat in the University of Tennessee, Nashville. Many of us have doubtless employed the forceps invented by Dr. Graddy for the treatment of trachoma.

The deaths are also announced of the following American ophthalmologists :

Dr. F. J. Parker at New York City, aged 39 years. He was assistant ophthalmic surgeon at the Manhattan Eye, Ear, and Throat Hospital.

Dr. Carleton H. Cammack, of New Orleans, at the age of 35 years.

Dr. Caleb S. Evans, of Union City, aged 70 years.

Appointments.

A well-known correspondent of THE OPHTHALMOSCOPE, Mr. J. Jameson Evans, has been appointed lecturer on ophthalmology in the University of Birmingham in succession to Mr. Priestley Smith, resigned.

Mr. Arthur C. Hudson, pathologist to the Hospital, has been appointed assistant surgeon to the Royal London Ophthalmic Hospital.

Mr. J. F. Cunningham has been appointed consulting ophthalmologist to the Royal Bethlehem Hospital, London.

Mr. Frank C. Crawley has been appointed ophthalmic surgeon to the Royal City of Dublin Hospital, *vice* A. H. Benson, deceased.

Dr. F. Vinsonhaler has been appointed ophthalmologist to the City Hospital of Little Rock, Ark.

Dr. L. v. Blaskowics has been nominated extraordinary professor in Budapest, and Dr. Josef Meller in Vienna.

Dr. R. Pardo has been appointed *privat-dozent* of ophthalmology in Modena.

Moorfields Hospital Annual Dinner.

AT the seventh annual dinner of the past and present students of the Royal London Ophthalmic Hospital (old style, "Moorfields") held at the Imperial Restaurant, Regent Street, W., on January 23rd, the chair was taken by Mr. W. A. Brailey. There was a good muster.

A Clinical Research Scholarship. MR. WILLIAM LANG, consulting surgeon to the Royal London Ophthalmic Hospital, has given a special donation of £450 to the Hospital, for the endowment for three years of a clinical research scholarship.

* * * *

Sir John Tweedy. SIR JOHN TWEEDY, with one other, has been appointed to represent the Royal College of Surgeons of England at the International Historical Congress to be held in London in April.

* * * *

American Ethics. THE ethical standard rules high in the American Ophthalmological Society to judge from the fact that it has been decided that the word "oculist" or any similar title should not appear after the names of members in the City or Telephone directories. Any such title employed in that way, it seems, is taken as a bar sinister to the election of a candidate into the Society. Even in conservative England we do not go to this length. It is pretty safe to say that almost every ophthalmic surgeon in London whose name figures in the *Telephone Directory* has appended to it some indication of his profession. And why not? Is the convenience of the public of no consequence?

* * * *

The Lease of a London Eye Hospital. IN view of the impending transfer of the Central London Ophthalmic Hospital, situated at the corner of Gray's Inn Road and Calthorpe Street, to new premises in Judd Street, the old place is advertised to be let on lease. Dust and memories and sentiment will soon cluster thickly around the old building, which, truth to tell, was never suitable for the housing of a hospital. It was merely two or three private houses adapted, as far as might be, for the purpose. Its dingy and depressing *façade*, its small and ill-contrived rooms, and its cranky staircases must have been a sore trial to those responsible for its upkeep.

* * * *

The late Professor Monoyer. A MOVEMENT is on foot to perpetuate the memory of the late Professor Monoyer, of Lyons, by the execution of a work of art, the exact nature of which is not yet announced. Dr. Th. Nogier, of Lyons, is acting as secretary of the memorial.

* * * *

XII International Congress of Ophthalmology. THE XII International Congress of Ophthalmology will meet at St. Petersburg, August 10th to August 15th, 1914. Professor Arnaldo Angelucci, of Naples, will be president. The official languages on this occasion will, in addition to English, French, Italian, Spanish, and German, include Russian. The subjects selected for discussion are:—(1) The ætiology of Trachoma, and (2) The nutrition of the Eye. A list of the corresponding members follows:—

Great Britain.— Mr. Walter Jessop, London; Sir H. R. Swanzy, Dublin; Dr. George Mackay, Edinburgh.

United States of America.—Dr. A. Knapp, New York ; Dr. Edmond Blaauw, Buffalo ; Professor G. E. de Schweinitz, Philadelphia ; Professor Adolph Barkan, S. Francisco ; Dr. W. H. Luedde, St. Louis ; Dr. Juan Santos Fernandez, Habana, Cuba.

Canada.—Dr. P. Coote, Quebec ; Dr. W. Stirling, Montreal.

South Africa.—Dr. Lindsay Johnson, Johannesburg.

India.—Mr. Henry Smith, Surgeon, I.M.S., Jullundar, Panjab ; Lieut-Col. Maynard, I.M.S. Calcutta.

Australia.—Dr. A. L. Kenny, Melbourne ; Dr. Roland Pope, Sydney.

Memorial to the late
Dr. St. John Roosa.

* * * *

A memorial tablet, designed by H. M. Shrady, was recently unveiled in the New York Post-Graduate School and Hospital in honour of the late Dr. D. B. St. John Roosa. Dr. Roosa founded the institution, was its president for upwards of twenty-five years, and so managed its affairs that it stands to-day as the largest institution of the kind in the world.

Dr. Lucien Howe.

* * * *

Dr. Lucien Howe has been elected secretary of the Buffalo Eye and Ear Infirmary.

Minnesota Academy
of Ophthalmology
and Oto-Laryngology.

* * * *

Dr. F. C. Todd has been elected president of the Minnesota Academy of Ophthalmology and Oto-Laryngology. The vice-presidents are Drs. H. James and E. R. Bray. Dr. L. A. Nelson is secretary and treasurer. The council includes the names of Drs. F. E. Burch, E. H. Parker, and C. N. Spratt.

Lectures at University
College, London.

* * * *

A NUMBER of special lectures in the medical sciences will be delivered at University College, London, during the current term.

The first of a course of lectures on "The Physiology of Vision and Colour Vision," by Dr. F. W. Edridge-Green, will be delivered on Wednesday, February 19th, at 5 p.m., and will be continued on succeeding Wednesdays until March 12th.

The Diploma in
Ophthalmic Surgery
of the University of
Liverpool.

* * * *

Drs. H. Hayward Bywater and H. J. Shaw were successful in the recent examination for the diploma of D.Ch. O. of the University of Liverpool. The following were the examination papers:—

Anatomy, Histology, and Physiology. Monday, Dec. 16, 1912, 9.30—12.30. Five questions only to be attempted.

1. Give an account of "Lister's law." What method is adopted for its experimental proof?

2. Give a description of the structure of the retina at the yellow spot, and illustrate by a diagram?

3. What structural and functional connexions exist between the right retina and the brain?

4. Draw a diagram to illustrate the cardinal points in the schematic eye, and the formation of an optical image by the schematic eye.
5. Give an account of the secretion and drainage of lachrymal moisture.
6. How is the intraocular tension measured? What physiological conditions modify it?

Diseases of the Eye. Monday, December 16th, 1912, 3-6. Five questions only to be attempted.

1. Give the reasons that might determine the removal of an eyeball. State the steps of the operation and the after treatment of the case.
2. Write a prescription in full for *five* of the following drugs:—(a) atropine, (b) homatropine, (c) eserine, (d) pilocarpine, (e) cocaine, (f) dionine, (g) silver, (h) copper, (i) zinc, (k) lead. State the preparation you prefer of each, the excipient, the mode of application, and the effect to be expected. Name any dangers to be avoided in particular circumstances.
3. Give the probable causes, mode of attack, symptoms, and treatment in a case of acute glaucoma, and one of acute iritis. Give the results to be expected respectively in the event of (a) the failure, or (b) success, of the treatment employed.
4. Describe the ophthalmoscopic appearances in optic atrophy. Name the most frequent causes, the character of the visual defects which may arise, and the probable ultimate result.
5. Describe the ophthalmoscopic appearances in (a) high myopia, (b) opaque nerve fibres, (c) retinitis pigmentosa, (d) syphilitic choroiditis, (e) sarcoma of choroid.
6. Describe the operation for extraction of senile cataract, detailing preparation of patient, difficulties likely to be encountered during the operation, and accidents which may occur later on, and adversely affect the convalescence.

Pathology and Bacteriology. Tuesday, December 17, 1912, 9.30—11.30.

1. Describe the gonococcus. How would you isolate it from pus? Enumerate the lesions it produces in the eye and its appendages.
2. Discuss the pathology of glaucoma.
3. Describe the common situations and microscopical appearances of the various types of sarcoma met with in the eye-ball.

The examiners were the professors and lecturers in each branch, with the addition of Mr. T. H. Bickerton and Mr. Hugh E. Jones, of Liverpool, and Dr. A. H. Griffith, of Manchester.

* * * *

A so-called "spectacle course" for ophthalmic surgeons will be held from March 3rd to March 8th next at the Royal Hungarian Eye Hospital, Budapest, under the direction of Dr. E. von Grósz. The lecturers are Drs. M. von Rohr and O. Henker, the scientific collaborators of the Carl Zeiss optical works at Jena. Novelties in optical instruments will be demonstrated during the course. Those who wish to join the course are requested to send the fee of forty crowns (£1 13s. od. or 8 dollars) to Dr. L. von Liebermann, Eye Hospital VIII Mária-Utca, 39, Budapest.

A Novel Departure.

Royal Society of
Medicine, WHAT promises to be an interesting meeting of the Sections of Ophthalmology and Neurology will take place on March 5th. at 8 o'clock p.m., when a discussion will be commenced on "Diseases of the Pituitary Body." It will be opened by Professor Schäfer and Mr. J. Herbert Fisher. There will be a demonstration of illustrative cases.

Oxford
Ophthalmological
Congress, 1913. AS readers already know, the next meeting of the Oxford Congress will be held on July 17th and 18th next. A discussion, to be opened by Mr. R. W. Doyne, Master of the Congress, will take place upon "The Present Position of Ophthalmology." Gentlemen desiring to speak are requested to send their names to the Hon. Secretary, 33, Welbeck Street, London, W.

Ophthalmological
Society. AT a somewhat sparsely-attended special general meeting of the Ophthalmological Society, held in London on January 23rd, it was resolved *nem. con.* to transfer the library to the Royal Society of Medicine, which offered, on its part, to allow unrestricted access to the collection to present and future members of the Ophthalmological Society. The Meeting further agreed to reduce the annual subscription from 21s. to 12s. 6d.

THE OPHTHALMOSCOPE DIARY.

Midland Ophthalmological Society.	Feby. 4th	Birmingham and Midland
	(5.30 p.m.)	Eye Hospital.
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	Feby. 5th	1, Wimpole Street, London.
	(8.30 p.m.)	
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	March 5th	1, Wimpole Street, London.
	(8.30 p.m.)	
Midland Ophthalmological Society.	April 1st	Birmingham and Midland
	(5.30 p.m.)	Eye Hospital.
Ophthalmological Society of the United Kingdom.	April 24th	London.
	and 26th	
French Ophthalmological Society.	May 5th	Paris.
American Ophthalmological Society	May 6th	Washington, D.C.
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	May 7th	1, Wimpole Street, London.
	8.30 p.m.	
Scottish Ophthalmological Club	May	
Midland Ophthalmological Society.	June 3rd	Shrewsbury.
	4.30 p.m.	
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	June 4th	1, Wimpole Street, London.
	8.30 p.m.	
Oxford Ophthalmological Congress.	July 16th	Keble College, Oxford.
	to 18th	
Section of Ophthalmology, <i>British Medical Association.</i>	July	Brighton.
Ophthalmologische Gesellschaft.	August	Heidelberg.
Section of Ophthalmology, <i>XVIIIth Int. Congress of Medicine.</i>	August 7th	London
	to 12th.	
American Academy of Ophthal- mology and Oto-Laryngology	November	Chattanooga, Tennessee, U.S.A.

THE OPHTHALMOSCOPE.

A MONTHLY REVIEW OF CURRENT OPHTHALMOLOGY.

VOL. XI.—No. 3.]

MARCH 1, 1913.

[TWO SHILLINGS.

CONTENTS.

Original Communications.—

	PAGE
1. Ernest Thomson, M.D.—British and Continental Eye Cliniques: Some Comparisons and Contrasts	136
2. George J. Burch, M.A., D.Sc., F.R.S.—On Negative After-Images with pure Spectral Colours	143
3. Lt.-Col. R. H. Elliot, M.D., F.R.C.S.—On the Use and Management of Self-Lit Ophthalmoscopes	145
4. P. de Obarrio, M.D.—The Rational Surgery of Retro-Bulbar Neoplasms: with Report of a case of Cylindroma of the Orbit, with Extirpation of the same and Preservation of the Eye ...	148

Clinical Memoranda.—

1. M. Sobhy, M.D.—A case of Congenital Coloboma of the Lens ...	156
2. Hanford McKee, M.D.—Foreign Body in the Orbit; Removal after two years.	159

Novelties.—

The New Sclerectome.—By Percy C. Bardsley, M.A., M.B., B.C. ...	160
---	-----

Review.—

Ptoxis.—By Harold Grimsdale, M.B., F.R.C.S.	161
--	-----

Translation.—

Guide to the Microscopic Examination of the Eye (continued). By Professors Greeff, Stock, and Wintersteiner.	170
--	-----

Current Literature.—

I. Miners' Nystagmus	175
II. Blindness	176
III. Syphilis and Injuries of the Eye	178
IV. Hæmatoma of the Orbit	180
V. Remedies	182

Book Notices	185
---------------------	-----

Correspondence.	191
------------------------	-----

Notes and Echoes	195
-------------------------	-----

The Ophthalmoscope Diary... ..	198
--------------------------------	-----

ORIGINAL COMMUNICATIONS.

BRITISH AND CONTINENTAL EYE CLINQUES: SOME COMPARISONS AND CONTRASTS.

BY

ERNEST THOMSON, M.D.

SUB-EDITOR OF "THE OPHTHALMOSCOPE;"
SURGEON, GLASGOW EYE INFIRMARY, ETC.

IN the last of the articles entitled "Notes from Some Continental Eye Cliniques," published in *THE OPHTHALMOSCOPE*, of December, 1912, it was hinted that a further article might appear, in which the German, Swiss, and Austrian kliniks should be compared and contrasted with British hospitals. To have compared the methods at any individual Continental klinik with the British type clearly would have been invidious; but now that the details of the former have been given with a minimum of comment, it is perhaps allowable to make certain remarks illustrative of differences between the two types which occurred to an observer hitherto educated wholly in British hospitals, differences which have not received any special attention in the text of the aforesaid articles. There are many points of contrast which must have been apparent to the reader, but these will not be dealt with here.

The Hospital, The Out-Patient Department, and the Nursing.

The Hospital Buildings themselves vary in accordance with their modernity. Some are new, some are ancient, and some are ancient but reconstructed. Speaking generally, the buildings are handsome structures, upon which money has been freely spent. The best have wide and lofty corridors, which in some cases are used as day rooms. The wards, too, are large and roomy, but in many cases—perhaps in most cases—they are overcrowded, and in winter time intolerably badly ventilated to the senses of a Britisher. The Continental system of central heating and the closed windows, produce between them an atmosphere which no British surgeon or matron would tolerate. I have a vivid recollection of one poor woman suffering from a septic condition, who resided in an isolation ward, surrounded by an atmosphere of her own making, which was so offensive that I hardly cared to follow the Professor on his visit to that ward.

If the conditions prevailing in the wards struck me as often far from ideal, the same can certainly not be said of the Out-Patient Departments. In many instances these were a revelation. There seems to be nothing that the surgeon can desire in the way of apparatus or instruments for diagnosis that he has not got, or cannot get for the asking. He has at his hand, and under his own control, a finely equipped laboratory, in which any histological, bacteriological, or urinary specimen can immediately be investigated by a competent worker. The patients are quiet and orderly in their behaviour, and there is no crowding in the consulting room (except in Vienna), at any hospital which I visited. As a rule, the patients are content to do as they are told without argument. This characteristic is doubtless the result of military training. If I have a fault to find with the average Continental out-patient department, it is that the dark room accommodation is rather small. In this connection, however, it must be remembered that the undergraduate is usually provided with a separate dark room. Of this more will be said later.

Of the Nursing I do not like to say very much, because I did not become intimately acquainted with it. That Continental nursing is on a plan different from British is notorious. In most places it is in the hands of the Roman Catholic Sisterhood, but there is an absence of uniformity, in a literal as well as in a general sense. In one operating theatre the nurses are dressed very much like British nurses; in another, the theatre nurse, when on duty, wears the black garments and the enormous headgear of the Sister of Mercy; in a third, the theatre nurse is entirely replaced by a junior surgeon, aided by a male operating room attendant. Even in one of the most rigidly aseptic theatres I saw the assistant nurse with her fingers in her mouth, and I fancy that this little observation indicates the incompleteness of the training of the Continental nurse as well as anything could indicate it, and accounts for the preference given in many operating theatres to the junior surgeon over the nurse.

Hospital Life.

Hospital life in the countries which I visited is a very different thing from that in ours. The house-surgeon, that bird of passage, who may be very interested, competent, and industrious, or, on the other hand, uninterested, incompetent, and lazy, does not exist, as we know him here. The professor is in the hospital every day, and for a great part of the day, and everything is under his personal guidance to an extent unknown on this side of the Channel. There is no such thing as divided control. Each klinik has but one chief. There is no such phenomenon as a number of chiefs sharing the services of a single house-surgeon. This single control of itself makes for smooth running, but there is another reason for the high efficiency in working. The man who goes upon the staff of a special hospital does not do so merely with the intention of gaining knowledge for use in general practice and of putting himself so much in pocket. To a very much greater degree than with us, he takes up the subject from the scientific standpoint, and is there in order to learn all about it. He is going to specialize, to become a *privat dozent*, an assistant-professor, and, ultimately, if possible, a professor. About private practice in the future he does not seem to worry. He is paid enough for his limited wants and devotes himself to the scientific life whole-heartedly and enthusiastically. He does the work which is done by the house-surgeon in this country, but his attitude of mind is different, because the work is the work of his life. He works, not only in the wards and in the operating theatre, but in the out-patient department and in the laboratory. Every detail interests him, and the approval and encouragement of the professor are his stimulus. While he works hard, he is probably not overworked, since it is safe to say that given a hospital employing two house-surgeons in this country, three assistants at the very least would be found in a similar Continental klinik.

When the assistant becomes an assistant-professor, and ultimately a professor, he continues to regard his work primarily from a scientific standpoint. His scientific enthusiasm never seems to give way in favour of the claims of money-making. Some professors make money in private practice, especially, of course, those who achieve a world-wide reputation; but it seems clear from the amount of time spent in hospital work that this latter, after all, continues to be the main interest in most cases.

In some parts of Germany and Switzerland the professor has his consulting room at the hospital, and consequently spends practically the whole day within its walls. I am not sufficiently familiar with the method by which the

private patient is distinguished from the hospital patient to discuss the matter ; but it is certain that in Germany, at any rate, any patient who can pay for his hospital treatment must so pay for it. The insurance arrangements provide for this, but, again, I do not know the details. Whatever may be the disadvantages of the system of mixing up hospital and private work, the medical welfare of the patient must be set on the credit side of the account. The professor has to his hand every possible convenience for diagnosis and treatment and has a suite of private wards in the hospital into which the private patient can be received at rates which must be vastly different from the rates at one of our nursing homes. In fact, the cost of treatment to the private patient is so very much less on the Continent (even where he is taken into the Professor's private hospital, or, as it is called, *private Klinik*) than it is in America, that I have known a patient come all the way from a Central or Western State to Vienna—a relatively expensive city—to have his cataracts removed, not so much because he thought the operator more skilful as because with equal skill the work was to come out cheaper, voyage, living expenses, and all, than the same work done by a first-class man in the States.

The Management of Patients.

It has been said that the German, with his views of "science" first, and everything else afterwards, treats his patients as so much clinical material and not as human beings, and that, in consequence, he is unkind and unsympathetic. British surgeons have waxed wroth over this aspect of the case. My impression is that it will be found that those who have most to say on this subject have visited only the very large teaching hospitals in the largest cities. Of these the charge is perhaps true to a certain extent, but how else than by a show of firmness, perhaps amounting to roughness, is it possible to deal with certain of the aliens who form so large a proportion of the clinical material in these large cities? How far will gentle manners go in getting these people to do what is best for themselves?

My impression of the treatment of the patients in the ordinary eye klinik, as it exists, for instance, in any ordinary German University town, is quite otherwise. The patients are treated in a perfectly kind and friendly manner. It is true they stand in considerable awe of the professor, and are most unwilling to refuse to do as they are told. Since they are not told to have any form of treatment which is to their disadvantage, so far as I was able to judge, but, on the other hand, have the advantage of the most recent research, I do not see that the absence of an "independent spirit" (such as we have to deal with so often) is to their disadvantage. I believe that the accusation of inhumanity in dealing with their patients is a libel on the Germans so far as ophthalmology is concerned. I cannot say that I saw anything but fair treatment, even in Vienna, and in most of the kliniks the relations between the patients and the hospital staff were positively friendly.

Educational Aspects.

From the point of view of the graduate, I was disappointed with the ordinary Continental klinik. It is necessary to speak subject to correction, since my experience was confined to those kliniks which have been described, and to one other which has not been mentioned. My impression from what I have seen myself, and learned from others, is that not much provision is made for the systematic teaching of graduates except in the largest cities, like Berlin and Vienna. It is true that special courses are given from time to time in various Universities, but not in all at the same time. This seems to

be a matter of arrangement between them. As I shall be at pains to show, the native *undergraduate* is so well grounded in ophthalmology that probably he does not require to take post-graduate courses in order to obtain enough knowledge to be going on with. The result of the insufficiency of post-graduate teaching in most Universities is, that in Vienna a school of post-graduate teaching has sprung up to which hundreds of those in search of rapid education annually gravitate from all parts of the world, but more especially from America. It seems strange at first sight, when one thinks of the great American Universities, that the proportion of American graduates in Vienna should be so great that every English-speaking foreigner is assumed to be American (for the average German or Austrian is quite unable to distinguish the difference in accent). I questioned a number of Americans on the subject, and ascertained that the main reason is that the great American Universities are small in number compared with the vast area of that country, and, consequently, that it is cheaper for the American who does not reside in or near a great teaching centre to come to Europe than to go to a home University. Besides, although Vienna is an expensive city to live in, it is not so expensive to live in when all the money is going out and none coming in, as is a great American city.

But why does the American go to Vienna and not to London? Because, he says, the London men are too busy with their private practice to lay themselves out seriously for systematic teaching. He would much prefer to come to London, or, shall I say, to Great Britain, but he cannot get what he wants there, namely, what may be called "spoon-feeding." In Vienna there are dozens of men who are making the principal part of a relatively good income by teaching Americans. The American has practically "cornered" the teaching in Vienna. He has become a power which controls the income of the teachers. The classes are arranged not so much by the teachers as by the American Medical Association in Vienna. Any foreigner wishing post-graduate classes is well advised to work through the Association.

When one comes to speak of the undergraduate in the German, Swiss, and Austrian University kliniks one has to recognise the enormous superiority of the teaching over that in this country. The whole teaching energy of the staff of the ordinary University klinik—that is, excluding those cities to which graduates do come in large numbers—is devoted to the undergraduate. The undergraduate learns ophthalmology, as he learns any other medical subject, systematically and well, and not as a kind of extra thrown in at the fag end of an already overloaded course of study. That such is the case is evidenced by the fact that every University in Germany has a Professoriate of Ophthalmology. That ophthalmology is a subject of first-rate importance is recognised by all, and it is taught as such a first-rate subject ought to be taught.

It is perhaps a fault that the student is usually excluded from the out-patient room, and is taught upon selected cases, and yet, when one considers the difficulty of teaching a large number of students who are new to the subject by the method of showing them a number of cases in succession under the disquieting conditions of an out-patient room, one cannot help wondering whether, even in this part of the work, the Continental method is not, after all, the correct one.

In the German Universities the student must attend a regular systematic course of ophthalmology, which is held at least three days a week. The lectures are, in the main, clinical lectures, and the more technical parts of the subject, such as ophthalmoscopy, refraction, and pathology, are taken up in separate courses. The student must work at ophthalmology for two

semesters. Each day so many of the senior or second semester students are taken up to the Professor's table and "quizzed" publicly on a certain number of patients. I think that the student usually has had a previous opportunity of examining the patient. If the student cannot answer the questions put to him by the Professor before the whole class, the Professor simply answers them himself, while the student looks rather foolish. If the student does answer the questions, the Professor may enlarge on the answers and make comments. Usually, the patients are made to "circulate" round the class, often in charge of an assistant, who demonstrates the points to each member of the class. Microscopic specimens, histological and bacteriological, are laid out very frequently, and the student can examine these at his leisure. As has been said, there are, in addition to this course, courses on ophthalmoscopy, on refraction, on pathology, and on the eye in relation to general diseases. How many of these courses are compulsory I am not sure, but the general course seemed to have the greatest number of students. In most kliniks there is a special dark room for the teaching of students, but even if not, the lecture halls are provided with ophthalmoscopic lamps. At any rate, the undergraduate student has ample time and opportunity to study the cases provided for him, and the assistants attached to the klinik are there to help him. They are whole-time men, and are available for the teaching of students at the class hours, which do not clash with the routine work of the klinik.*

With regard to operations, the students are invited in rotation. One must admit that the sum total of operations which an individual will witness in a session cannot be very large. But how much operative work is likely to come in the way of the practitioner afterwards? How much more important is the recognition of disease of the eye, and the treatment of ordinary cases, than the operative side of ophthalmology, so far as it concerns the general practitioner?

Doubtless, the privilege of being present at operations is much valued, and it is probable that the student who is anxious to learn gains more knowledge from a few operations witnessed as a privilege, and under favourable conditions, than he would if attending as one of a crowd invited or expected to attend as a matter of course.

I do not think the undergraduate student has much opportunity of entering the wards.

The lecture halls of these Continental kliniks are, as a rule, very fine. They are not used for any other subject than that of ophthalmology. They are fitted up with much and varied apparatus and diagrams, and are provided with all the arrangements necessary for the use of projection apparatus at any season of the year.

While on the subject of education, I should like to say a word or two about the *Referat*. Perhaps the best translation of this word is "Review." I have little doubt that the institution exists at most kliniks, but it was only at Freiburg that I had the opportunity of being present at a *Referat*.

The *Referat* is a meeting which is held periodically in the evening for the discussion of the more important cases which have been occupying the

*Note.—Since the foregoing remarks were written, Professor Axenfeld and Dr. von Szily, of Freiburg have been kind enough to read the parts of this article on "Hospital Life" and "Educational Aspects." From a note by Professor Axenfeld I gather that in the first semester the undergraduate student studies ophthalmoscopy and in the second semester attends the lectures and submits to examination on cases. The Professor also speaks of the students attending the "Klinik," and in Freiburg I certainly observed that for a limited period each day the students did come to the out-patients. In other places on the Continent I saw no students attending out-patients. In any case I am probably right in thinking that education in the actual out-patient department is not a great feature of German, Swiss, or Austrian teaching.

attention of the staff. All the members of the staff, the professor, the assistants, both paid and voluntary, and any graduates and undergraduates who may be invited are present at the *Referat*. The meeting is informal, and the professor, while in a general way conducting the proceedings, sits among the others when not actually carrying out some demonstration. The cases under review are discussed, one member of the staff introducing one particular subject, another, another subject. Beer and glasses are on a table and one of the assistants acts as host to see that the glasses are replenished when empty. If a distinguished foreigner who has done some special work happens to be present, he is asked to talk about it. Could anything be more useful as a regular part of the work of the klinik than this *Referat*? Is the efficiency of the German klinik to be wondered at when a medical staff, proportionally larger than ours, works day and night in the service of the patients and in the cause of science? "How many hours a day do you work?" Such was the question I addressed to an assistant professor. "About twenty-six," was the joking reply, but it contained the pith of the matter.

Diagnostic Methods.

I have no special desire to praise things Continental because they are Continental, nor to show that ophthalmology is better, in Germany, for example, than in this country. I do not consider German operative manipulation better than our own. Nor are the general amenities of German hospital wards equal to our own. That the nursing is far behind ours is certain. But with regard to diagnostic methods, the German, Swiss, and Austrian surgeons, as I saw them, have everything in their favour. I do not say that they are better clinicians in respect of penetrative ability in the matter of diagnosis. Probably the British surgeon of large experience cannot be beaten in this. But the Continental surgeon has three great things in his favour in making a refined diagnosis, not only in cases which are important from the point of view of treatment, but in all cases from the point of view of scientific knowledge. These three things are ample time, ample assistance, and ample apparatus. In a well-conducted klinik there is no such thing as guessing at a diagnosis of syphilis or tubercle if any known methods of investigation will settle the question. No question of cost or of skilled assistance, will arise to prevent an immediate use of these methods in as many cases per week as present the slightest doubt. Then take tonometry. Why has tonometry flourished so much more on the Continent than here? Simply because the German can call upon the services of an assistant to do nothing else, if need be, than examine every case that comes into the out-patient room. Perimetry is another example of the same thing. It is a time-consuming process; no matter, an assistant will take fields of all the patients if necessary. To cut the matter short, when the chief is working out the diagnosis of an important case, he has all the facts before him, no matter how much time, what refined and expensive apparatus, or what chemical or biological skill has been necessary in order to obtain these facts. There is no restriction with regard to experiments on animals, a matter in which the British worker is very seriously handicapped.

Operative Work.

So much has been said already about operative work in the articles on individual kliniks that not very much remains to say in the nature of comparison.

The standard of asepsis varies very much, as it does in our own country. Partly, at least, this depends upon the different views of operators as to the necessity, in ophthalmic work, of a rigid aseptic technique carried to its finest point. Some of the most renowned men strike one as being a little too lax; others carry things to an extreme. Of course, there are almost always loopholes, and these loopholes are very readily seen by a trained observer who may be visiting the operating room.

There is one respect in which Continental operative practice differs markedly from our own, and upon which I have not as yet said much. I mean the matter of general anæsthesia. General anæsthetics are very unpopular for eye work. Nearly everything in some kliniks is done under local anæsthesia. I have referred in the article on Berne to the use of local anæsthesia for enucleation as a matter of routine. Probably not many surgeons go so far as that. Nearly all plastic work is done under local anæsthesia in most kliniks. In Fuchs' klinik a general anæsthetic is not given, as a rule, in glaucoma cases, where a British surgeon would certainly prefer it, and consider it necessary. Without prejudice to the question of the sufficiency or otherwise of local anæsthesia in any given case, I fancy that the Continental surgeon is less confident in general anæsthetics than we are. Probably he has not the same tradition in the matter, nor as good an education in the administration of general anæsthetics. On the other hand, he has developed a technique of local anæsthesia which is very perfect. To what extent popular prejudice enters into the question I did not ascertain. It is certain in any case that in Germany patients under local anæsthesia control themselves in a stoical manner, which may be the result partly of the phlegmatic temperament and partly of an inborn reverence for authority.

Ophthalmoscopy.

Perhaps of all the contrasts between British and Continental work the most striking to me was the use by many men of the indirect method to the exclusion, or practical exclusion, of the direct. I am far from denying the value of the former, but when the question arises as to which of the two is of greater value I do not think many British surgeons will favour the indirect method. I noticed at once that the foreign surgeons are very expert indeed with the indirect method. In certain difficult cases they can see things with it that one who is less expert cannot see. For that they deserve every credit. If you ask them why they make so little use of the direct method they are apt to deny the correctness of the assumption and to say that they use both. But do they? I have seen fine changes in the fundus missed by one of the best men entirely through relying on the indirect method exclusively. It is certain that in some kliniks the indirect method is the method taught first, the direct being left to the end of the course. An American assistant in one of the kliniks, a man who had had a good deal of experience but who was wholly German educated, admitted to me that he could not see the fundus of an emmetrope with the direct method without using a minus glass.

I came to the conclusion, after observation of their work, that most Continental surgeons are less expert with the direct, and more expert with the indirect than we are, that is, speaking generally: I know that many in this country are very expert with the indirect method. I raised the question with Continental men repeatedly, but never could get an admission that they neglected the direct method. So much was this the case that I began to wonder if I was wrong until the following paragraph in Hirschberg's *Treatment of Shortsight* (Lindsay Johnson's translation, page 34) met my eye:—

"This (namely, the fundus of the highly myopic eye) is only to be

perceived by the direct method of ophthalmoscopy (upright image) with the assistance of a correspondingly strong concave glass behind the oblique mirror. Unfortunately, this method of investigation, which in any case requires a good mirror and considerable practice, is not always possessed by either teachers or pupils, although it is worth practising on account of the rich stores of information which it affords."

The foregoing quotation from the work of the great German ophthalmologist and teacher (although I doubt if the word "perceived" correctly translates the German original, which I have not at hand) fully bears out what I had observed for myself, that many Germans neither practice nor teach the direct method in the way they should do. In other words the "rich stores of information" are sometimes never found.

Refraction.

I have very little to say on the subject of refraction, because the subject is not one into which I had any desire to enter. I do not think the Continent of Europe has anything to teach us. Refinements in spectacle and eyeglass frames seem to leave the Germans cold. My bifocal glasses were sometimes an object of curiosity. No doubt the fact of the German nation tending so much to myopia accounts for that. Bifocals are essentially the necessity of the hypermetropic presbyope.

Atropine is less used in refraction work than with us. There seems to be a considerable prejudice against it, but whether the prejudice comes from the side of the patient or of the surgeon I do not know.

Conclusion.

In finishing this series of articles on Continental Kliniks I would take the opportunity to thank all those who extended their kindness and courtesy to me on my travels. The list must include not only the professors and their assistants who received me in almost every instance with cordiality, and often went out of their way to help me, but also many men of many nationalities who were much better acquainted with the "ropes" than myself. More particularly I would like to say that from the Americans whom I met in Vienna I received a great deal of help, and in that great city a stranger is apt at first to feel very lost.

In every instance but one the articles on individual kliniks have been read over in the proof by the Professor himself, and for that reason should contain a minimum of misstatement, such as is so likely to creep in in articles of this kind.

ON NEGATIVE AFTER-IMAGES WITH PURE SPECTRAL COLOURS.*

BY

GEORGE J. BURCH, M.A., D.Sc. Oxon., F.R.S.

OXFORD, ENGLAND.

IN a paper "On Negative After-Images and Successive Contrast with Pure Spectral Colours," by Mr. A. W. Porter, F.R.S., and Dr. F. W. Edridge-Green,†

*Paper read before the Royal Society, January 16th, 1913.

† Roy. Soc. *Proceedings*, 1912, B, Vol. LXXXV, p. 434.

the authors describe certain experiments, which they consider impossible of explanation on either the Hering or the Young-Helmholtz theory of colour vision.

In justice to Thomas Young, it is only fair to point out a discrepancy between the title of the paper and the experimental conditions therein described, viz.: "The method adopted was as follows: In a dark room, *in which, however, there was a certain amount of stray light*, a horizontal spectrum, as pure as possible, was projected on a screen. A portion of the retina of one eye was then fatigued by rigidly gazing at a portion of another spectrum, isolated in the Edridge-Green colour-perception spectrometer. . . . After the fatiguing light had been viewed for about 20 seconds, the eye was turned to the screen, so that the after-image formed a band running right across the spectrum on the screen and occupying its centre."

The italics are mine. It is impossible too strongly to emphasise the fact that a spectrum projected in a room, "in which there is a certain amount of stray light," cannot be regarded as consisting of pure spectral colours.

The phenomena recorded can all be explained when the stray light is taken into account, and they agree perfectly with Young's theory. Moreover, they are familiar in laboratory practice. Thus, in paragraph 1, the effect of red light on the blue and violet, rendering these darker and bluer along the line of the after-image, is easily understood if we regard these colours as contaminated with white, the red element of which is removed by the fatigue.

In paragraphs 6, 7, 8, and 9, the fatiguing ranges were orange-yellow yellow-green, blue-green, and blue as far as λ 475, and the after-images are said to have been purple, evidently by admixture with the violet of the stray light. But in paragraph 10, with fatiguing light λ 445- λ 455, the after-image was yellow-green—clearly because the violet of the stray light was cut out by fatigue.

In paragraphs 16 to 20, experiments of a more complex character are described, all, however, capable of explanation in accordance with Thomas Young's theory, if the stray light is taken into account. This part of the paper ends with the words: "No matter what portion of the spectrum was selected, the after-image, where it crosses the spectral band, was seen as a grey square." That alone is sufficient to demonstrate the presence of stray light.

Under the head of Conclusions, the authors state that "the negative image is much darker, more difficult to produce, and more evanescent in the absence of all external light as when black velvet and the hands are placed over the eyes. It is obvious, therefore, that external light has an influence on negative after-images." I have used almost these identical words in lecturing on this subject any time these fifteen years. But I have quoted them from the papers of Robert Waring Darwin, which are printed in the *Philosophical Transactions* for 1786, and were undoubtedly made use of by Young in formulating his theory.

It is difficult to understand how anyone can expect to find acceptance for his bare statement, that "it is impossible to explain these facts on the Young-Helmholtz theory of colour vision."

I have described in my paper "On the Relation of Artificial Colour-Blindness to Successive Contrast"* various methods of observing the phenomena of successive contrast with really pure spectral colours, using stimuli no stronger than those employed by Mr. Porter and Dr. Edridge-Green. My results are different from theirs, and are in all respects quite in accordance with the theory expounded by Thomas Young.

* Roy. Soc. *Proceedings*, 1900, Vol. LXVI, p. 206.

It is a matter of everyday demonstration in the laboratory that, using moderate stimuli, with persons of normal colour sensation, yellow does change to green after fatigue to red, and to red after fatigue to green. And I am bound also to note that persons whose green sensation is weak, fail to see this change in the colour of yellow after fatigue.

ON THE USE AND MANAGEMENT OF SELF-LIT OPHTHALMOSCOPES.

BY

LT.-COL. R. H. ELLIOT, M.D., F.R.C.S.

SUPERINTENDENT OF THE GOVERNMENT OPHTHALMIC HOSPITAL, MADRAS, INDIA.

VISITORS to the Madras clinic, coming from many parts of the world, have expressed their surprise at the fact that we have entirely replaced the old reflecting ophthalmoscope by instruments self-lit by means of the electric current. Their surprise has, however, been surpassed by the pleasure they have experienced at finding the extreme ease with which these instruments can be used. On a recent occasion, when the All-India Sanitary Conference met in Madras, a number of its members, who had not touched an ophthalmoscope for many years, were shown the fundus with an electric ophthalmoscope as simply and as easily as they could have been shown a picture hanging on a wall through a hole in a partition. Not only so, but it is our practice to demonstrate the fundus with this instrument to lay visitors to the hospital. Those who have worked in the clinic have taken readily and permanently to the use of the electric ophthalmoscope. Few things struck me more during my visit to England in 1911 than the fact that British surgeons regard this instrument so coldly and indifferently. A few of them, who have been persuaded to try it, have proved most ready converts. It is probably no exaggeration to say that it embodies one of the greatest modern advances in our armamentarium for ophthalmic diagnosis, and yet that it can hardly be said to have obtained recognition at the hands of British ophthalmic surgeons. It is with a view of bringing its great advantages before them in a practical form that the following notes are written.

Nearly ten years ago, we first commenced using electric ophthalmoscopes in Madras. This decade has seen great improvements in the types of instrument on the market, and has at the same time witnessed a great simplification in the methods of obtaining the necessary electric current. I propose to discuss both these aspects of the question.

In the course of the last nine years we have tried a large number of electric-lit ophthalmoscopes. Some of these have been useless; others have proved very useful. In the latter class there stands out one instrument which, in our experience, has no equal, *viz.* : the Morton-Marple ophthalmoscope.

The essential features of this instrument are two : the U-shaped mirror, and the arrangement whereby the distance of the source of light from the condensing lens (carried at the top of the tube of the instrument) can be altered in such a way as to provide a convergent, a parallel, or a divergent beam of light at will. Mechanically this is very simply effected : the small lamp that furnishes the illumination is moved up or down in the tube by means of a knurled ring encircling the handle. The advantage of the U-shaped mirror is that the light gives no reflexes and thereby makes

examination very easy. With a very little practice, it is possible to make a very extensive examination of the fundus with this ophthalmoscope through a contracted and quite small pupil, whilst the view through a dilated pupil is not only magnified but is also so extensive that it requires to be seen to be appreciated. In this connection it is necessary to emphasize the fact that the examiner should approach his own eye very close to that of his patient, frequently touching the patient's face with his own in order to do so.

The advantages of the variation in the beam of light made possible by the Marple arrangement can only be estimated after due experience with the instrument. The whole fundus can be flooded with diffuse light, or a strong beam can be focussed upon any required point, throwing into brilliant relief the details of the particular structure which one may desire to study.

In Madras our ophthalmoscopes are lit either from a Pantostat, or from a combination of resistances. In either case we can slide the indicator of the fine resistance along its bar with one hand, whilst manipulating the ophthalmoscope with the other. The fact that we are able to alter the focus of the beam and at the same time to vary the amount of light thrown into the eye, makes the instrument extraordinarily elastic in use. Any ophthalmologist will appreciate the advantage of such a combination.

If desired, the instrument can be employed for indirect examination, but probably many who adopt it will find that this is rendered unnecessary by the combination of arrangements whereby the focus of the light can be altered at the same time that its brilliancy is increased or reduced at will. In Madras we rarely, if ever, now use indirect examination.

For the examination of opacities in the media, no method with which I am acquainted can compare with the use of a +4 D to +6D lens on the ophthalmoscope used at a distance of about 1 foot or less from the patient's eye, a strong parallel beam being employed. As the examiner alters his distance from the eye, opacities at various depths spring into vivid relief as dark clearly outlined objects seen against the red reflex of the fundus.

There are some practical points which should be borne in mind in choosing an ophthalmoscope of the type under review:—

(1) The long case which is supplied for the later models allows the instrument to lie in it securely protected, and at the same time ready for use at a moment's notice, without the necessity of any fitting of the parts. A small slot should be cut in the case opposite the distal end of the instrument, in order to allow the wire to pass through the case, round the outside of which it can then be easily wound when put away.

(2) In some of the latest models the ends of the wire are brought to a short friction plug, and when it is desired to use the instrument, this is inserted into a socket at the lower end of the handle. This serves practically as a switch and at the same time makes the termination of the wire very easy to get at, in case anything goes wrong with it. The older models were much less handy in this respect.

(3) The little U-shaped mirror has, at the writer's suggestion, been made easily replaceable. It simply slides into a slot. As a sudden jar may break a mirror, this is an important provision for those who work in India or the colonies.

(4) The U-shaped mirror should have the glass of the sight-hole cut away, and should not merely have the silvering scraped off over this area. The latter device is greatly inferior to the former, and does not abolish the troublesome light-reflex in the effectual way the former does.

(5) The gap of the sight-hole should be sufficiently large. In some of the earlier models this was not the case, and the result was that the instrument

was not at all easy to use. We find that the mirror works well if its sight hole is 1.33 mm. long and 4.5 mm. broad.

It may seem unnecessary to lay stress on all these points, but practical experience will demonstrate their great importance.

With regard to the best method of illuminating the instrument, there are practically four methods, to each of which we have given a full trial in Madras. We may take them in turn. Before doing so, it must be stated that a current of about 4 volts is required when the lamps are new. As time goes on, the lamp filament hardens, and may then require a current of 5, or even 6, volts; there is this compensating advantage, that an old lamp becomes much more durable and more capable of withstanding sudden alteration in voltage than a new one. With care, a single lamp will last in daily active use for from six months to a year. There are, however, certain precautions to be observed. It should not be used on too high a voltage when it is new (nor is this at all necessary), and should be switched off at once when not in use. If these points are attended to, a long and busy morning's work can be done without the least danger to the lamp. "Spares" should, however, be always at hand, for lamps vary greatly, and some will be found to be very short-lived. Whatever arrangement is used, a switch for the purpose of turning the current off and on should invariably be included in the circuit.

We now pass on to the various sources of electricity :—

(1) Wet batteries. Of these we found a combination of sal-ammoniac cells the most satisfactory. The objection to these is, first, that they require a good deal of looking after, and, second, that they are difficult of transportation.

(2) Some form of dry battery, or secondary cell, may be used. Of these one of the most satisfactory is the Hellen's "Flight." These can be obtained yielding 4 volts per cell and one such cell will last six months or more in active work, even in a damp moist climate like Madras. When the battery becomes too weak for further use, it can be put aside until the new one employed has likewise run below 4 volts. The two can then be joined in series and used with a small resistance. The best form of the latter is one capable of being altered by means of a sliding knob. A further great advantage of this arrangement is that it enables one to go on using an old lamp whose increased resistance requires the employment of 5 or even 6 volts of current. The cells are readily transportable. They can be obtained in most countries, and they give no trouble.

(3) We may employ resistances in order to reduce the town current. In Madras, where the latter is supplied at 225 volts, we have found the best method to be the introduction into the circuit of two fan regulators connected in series, whereby the current is reduced to 20 volts. The introduction of a further small resistance, with a sliding adjustable knob, enables us to obtain a current which can be varied at will from 2 to 20 volts, thus permitting the use on the same circuit of any of the low voltage instruments employed by ophthalmologists, including the Hugo Wolff Retinoscope and the Czapski Corneal Microscope. A volt-meter included in the circuit saves much time and avoids the burning out of lamps. In Madras we never omit it.

In damp weather in the tropics some inconvenience may be experienced from shocks transmitted to the examiner or to the patient from the ophthalmoscope. Such shocks are much more severe if the metal work of the ophthalmoscope is connected with the ground wire of the supply. All our instruments are fixed on plugs which are supplied with one coarse and one fine rod. The result is that it is impossible to use the instrument

on the wrong wire. Any electrician will once for all fit the plug socket up correctly. The correct use of it subsequently becomes mechanical. In the monsoon weather in India, when examining patients with naked or damp feet, slight shocks may still be felt. These can be eliminated if the examiner and the patient stand on a plate of glass, or on a dry blanket. Care must, however, be taken to avoid uncovered parts of the bodies, either of the patient, or of the surgeon leaning against a damp wall. In Madras, we always perform ophthalmoscopy standing, and with the patient leaning his back against the wall. A dry blanket placed between the patient's back and the wall deals with this difficulty. More elaborate permanent arrangements can easily be made, such as covering the wall in question with glass, or panelling it with wood, but the inconvenience we have been speaking of is met with only on a few days in a year, even in our damp climate, and will probably be absent in Europe.

(4) The use of a Pantostat, or of some similar form of transformer, such as may be supplied by any of the leading surgical firms, undoubtedly provides the most comfortable method of working. The only objection to it is on the ground of expense. In Madras we are replacing the arrangements previously described by Pantostats, and we are well pleased with the results.

THE RATIONAL SURGERY OF RETRO-BULBAR NEOPLASMS :

With report of a case of Cylindroma of the Orbit, extirpation of the same, and preservation of the Eye.*

BY

P. DE OBARRIO, M.D.

SAN FRANCISCO, CALIFORNIA.

General Considerations.

FOR purposes of description, and as a guide of some diagnostic value, it is well to divide the orbital cavity into four quadrants or sections, and to recall the bones forming its boundaries, as well as the soft structures contained therein.

In a general way, the upper quadrant or vault of the orbit, presents a larger space for the growth and expansion of neoplasms; the external quadrant comes next as to capacity; then the inferior; and, finally, the internal. The nine openings of the orbital pyramid serve as gateways or passages for the transmission of motor, sensory, and trophic nerves, arteries, veins, lymphatics, etc., to and from the eye, and beyond the orbit and its contents to other portions of the face and accessory cavities.

The orbital contents are of such a variety that there are but few tissues not represented. Hence, it is natural to expect that every variety of neoplasm, both malignant and benign, has been found and described, some being relatively frequent, and others extremely rare.

From the standpoint of embryology, we should expect this also to be true, as in fact the orbit and orbital contents develop from the epiblast and mesoblast, and all tumours, both malignant and benign, are the offsprings of

*Read before the Eye, Ear, Nose, and Throat Section of the San Francisco County Medical Society, January 23rd, 1912.

these embryological *strata*, excepting the non-malignant adenomata and the malignant columnar-celled carcinomata, which are of the hypoblastic epithelial variety.

Roughly speaking, the field that occupies our attention comprises, then, a rigid, conical-shaped, bony container formed by seven cranial bones, lined by a continuous periosteum pierced by nine foramina or channels, and lodging the lacrymal gland and adnexa, the ocular muscles, orbital fat, and cellular tissues, arteries, veins, nerves, lymphatics, a nerve of special sense, and the eye proper, which is a world in itself. All of these anatomical structures may and do give rise to neoplasms. In addition, we have metastases from other growths elsewhere, as well as invasions from adjacent cavities. It is easy, then, to foresee the great variety of simple tumours as well as the perplexing number of compound neoplasms that we may have to take into consideration in attempting a diagnosis. The intricacies of the problem are forcibly brought to mind after one has made one or more efforts at diagnosis with its attending surprises, or witnessed the brilliant failures of those with unlimited material and experience at their command. I will abstain, therefore, from attempting a list of these growths, and only mention in a broad general way, that as we have to contend with a rigid container and soft contents, we should likewise expect the presence of hard solid tumours, such as osteomata and enchondromata, or semi-solid tumours, as fibromata, neuromata, lymphomata, etc., and liquid such as angiomata, cysts, etc.

General Symptoms.

Having thus briefly outlined the possibilities of orbital new growths, we review next the general symptoms that we may expect from their presence in the orbit. These symptoms may be catalogued as follows :

- 1st. Exophthalmus.
- 2nd. Impaired function.
- 3rd. Presence of visible or palpable tumefaction.

I place the exophthalmus in the first place because I do not conceive the existence of a new growth seated in the orbit without the presence of this symptom, although the neoplasm be not visible or palpable or even of small dimensions, for if the orbital contents are increased in size or displaced by its presence, the exophthalmus will always be detected after careful investigation, although, at times, it may be a difficult matter, requiring the use of the exophthalmometer.

The impaired function will be as regards motility and acuity of vision. As to motility, it is a well-established general principle that it will be diminished or impaired in the direction of the seat of the growth. As regards acuity of vision, it will be reduced in direct proportion to the volume of the neoplasm as well as in direct ratio as to its location, whether its greater bulk is situated posterior to the equator of the eye or not; the symptom being more pronounced the more posterior the situation.

In speaking of the seat of the growth, it is well to bear in mind that its location in the orbit will be diametrically opposite to the direction of the exophthalmus, and, as a logical consequence, it is well to divide exophthalmus into the following varieties :—

- (a) Vertical, comprising upward and downward displacements.
- (b) Horizontal, comprising inward and outward displacements.
- (c) Diagonal, comprising four varieties, upward and inward, upward and outward, downward and inward, and downward and outward.
- (d) Directly forwards.

Each one of these varieties has a meaning according to the rule laid down above, and by reviewing the anatomical elements that are contained in each of the four quadrants of the orbit, we may gather some idea as to the possible nature of the new growth.

Following this classification, it is fair to assume, for instance, that a forward displacement of the eye, with a slight upward and outward deviation, is an indication of a tumour of the optic nerve. Likewise, a downward displacement would indicate the presence of a growth at the vault or adjacent tissues; an upward displacement would have a similar significance as regards the lower wall of the orbit. An oblique displacement downwards and inwards would be suggestive of a new growth of the lacrimal gland or adjacent bony wall, whilst a displacement downwards and outwards would be strongly suggestive of frontal sinus involvement in the shape of an exostosis, for instance; an outward displacement should call attention to an affection of the ethmoidal sinuses, and a similar reasoning should be properly applied to each one of the varieties enumerated above.

I may mention in passing bilateral exophthalmus, such as occurs in exophthalmic goitre, or that consequent on thrombosis of the cavernous sinus; pulsating exophthalmus, and orbital angiomas. Cystic collections must be included, but I omit panophthalmitis and such neoplasms as invade the orbit by propagation from within the eye, as they are beyond the scope of this work; also emphysema orbitaria or the traumatic hæmatomata which also cannot be properly considered here.

Means of Investigation.

The means of investigation that we have at our command are the history of the case, inspection, palpation, percussion, transillumination, focal lighting, fluoroscopy and skiagraphy, which should be always employed, whenever possible, as giving information of the greatest value. Another very useful aid is the aspirating needle, which should never be forgotten where there is the slightest indication of the presence of fluid, even if after palpation you are impressed with the resistance of the growth, since it happens at times that the liquid is enclosed in a non-elastic container under relatively high pressure. The aid of the exophthalmometer in the doubtful cases of eye protrusion is of such value that it should not be neglected.

It is well to follow all these measures in a systematic manner, much in the same way that a physical examination is conducted in any other region of the body, in order to ascertain the nature of a case, or to reduce to a minimum the possible failure of diagnosis.

Treatment.

Having come now to the question of treatment, I will mention only such general medical measures as are applicable to gummatous affections, or the electro-therapeutics of the angiomas and of the muscular paralyses which permit of a forward displacement of the eye, and confine myself to surgical interventions proper.

In order to use some method in classifying the great number of procedures at our disposal, I will group them into several categories comprising:—

- (a) Extirpation through soft parts with preservation of the eye.
- (b) Extirpation through a bony flap with conservation of the eye.
- (c) Extirpation with ocular enucleation.
- (d) Exenteration of the orbit, which may be complete or subconjunctival or plastic.

Of these four procedures, I wish to lay particular stress on the first,

method ; that is to say, the extirpation through soft parts with preservation of the eye, as, to my mind, in the great majority of cases one should be able to obtain satisfactory results without resorting to the more radical methods enumerated above. It is my desire to be very emphatic here, although, to avoid any misinterpretation, and to make myself perfectly understood, that at no time would I sacrifice thoroughness to conservatism, but I should always be rational on principle, and eventually as radical as the particulars of every individual case would demand.

I maintain in order to enter the orbital cavity once it has been invaded by a neoplasm, and at the same time not to injure the eye, and, furthermore, to obtain sufficient space for all practical purposes, that the incision should preferably lie at about one to two centimeters from the orbital margin and parallel with it. The incision may be situated at any part of the circumference, naturally at the point of greatest protrusion.

The next point is a careful dissection, whereby one should be led to a point of cleavage in all encapsulated tumours, and by following the same with a blunt instrument, extirpation will be greatly simplified. The next step is the inspection of the seat of the neoplasm by direct vision and digital palpation, whenever practicable. A good many cases of alleged recurrence are due to neglect of this detail.

I furthermore insist that the value of this method is based on the fact that in all tumours of the soft parts or of the walls, excepting perhaps those arising from the ocular muscles, or from the optic nerve, the expanding impulses of the growing neoplasm, gradually, but most effectively, exert their influence in all directions ; but as the osseous container is non-yielding, the soft parts will be displaced towards the point of least resistance, or, in other words, forwards as well as diametrically opposite to the point of its attachment. As a direct consequence of this expansion, the tumour will dissect its way outwards and meet you half way, so to speak, in your effort to extract it. If such a tumour be not of a malignant nature, there should be no reason for employing any other route than the one I have described.

Such growths as are located at or in front of the equator of the eye, make their appearance early at the orbital margin, and their recognition and removal are rendered relatively easy. Behind the equator of the eye, the digital or visual recognition of these growths is a matter of greater or less difficulty in direct proportion to their volume.

In all cases of exophthalmus the optic nerve will be rendered tense, the muscles, together with the ciliary nerves, arteries, and veins, will be put upon the stretch ; the orbital fat will be crowded out of the way, as well as the lacrymal gland. All these structures, coming under the category of soft tissues, are naturally more or less elastic and yielding, principally under the stress of a slow process, and upon this faculty is based the great advantage whereby the eye may be dislocated to an apparently alarming or dangerous degree, in order to suit one's needs in the course of a surgical intervention, without harmful results, as will be demonstrated later on.

The faculty of relaxation of the orbital tissues is present to a superlative degree in the rabbit's eye, as it is possible to dislocate the same to the extent of placing the lids behind the globe by merely pulling the eye forward without causing the slightest trouble or reaction. This manœuvre is familiar to everybody who has done any experimental work with these animals.

In entering the orbit through the soft parts, the method of going through the lids only is adopted by Maisonneuve, Acrel, Halpin, and others. Entering through the conjunctiva without tenotomies but with optical neurectomy is adopted by Knapp, whilst Rohmer uses the same route but with tenotomies.

The combined method, passing through both the lids and the conjunctiva, is a third way of entering the orbit, and a very satisfactory one according to the nature of the case.

Any one of these methods should be adequate to obtain satisfactory results in the majority of cases.

There are, however, a great number of surgical procedures, comprising, as a basic principle, the formation of a bony flap. Briefly, they involve :

- (a) Resection of the superior orbital wall.
- (b) Resection of the inferior orbital wall.
- (c) Resection of the internal orbital wall.
- (d) Resection of the external orbital wall.

A description of these operations would unduly lengthen this paper, the primary intention of which is to demonstrate how large neoplasms may be extirpated without their need. I may review them, however, very briefly.

(a and b) Resections of the superior or of the inferior orbital walls have apparently not had a wide range of usefulness, as little mention is made of them in the literature. (c and d) As regards the resections of the outer and of the inner walls, on the contrary, a considerable number of procedures have been adopted or suggested, all of which may have their place in special cases.

The principal operation for the removal of the outer orbital wall is that of Krönlein, which has been modified in several ways. Another procedure is the removal of the malar bone. One noteworthy modification is that of Lagrange, of Bordeaux, which consists in mobilising the outer orbital wall with the view of dislocating the eye in that same direction after opening the conjunctiva at the inner angle and approaching the orbit through this angle. It is claimed by the author that it gives a very large space to work in.

Besides these, there are several procedures for the exposure of the ethmoidal cells and frontal sinus that incidentally open the orbit in an extensive manner such as the operations of Maure, of Gussenbauer, of Killian, etc.

The operations of orbital exenteration and enucleation find their place in such extreme cases as call for such radical procedures.

I have already mentioned the method I have adopted, consisting in a semi-circular incision at the orbital margin, or, better, removed one or two centimeters from the same, to be located at the seat of greatest tumefaction and comprising in one move all the soft parts down to the bone, as an eminently satisfactory way of reaching the orbital cavity. By this procedure it should be possible to extirpate a great majority of growths by careful dissection and by gradual dislocation of the globe without further tenotomies.

As an illustration of the foregoing statement, I now present a report of a case of large cylindroma of the orbit operated upon by me without tenotomies, or bony resection, or opening the conjunctiva, with preservation of the eye in its entirety, together with all its functions.

Case.

In August, 1909, there was admitted into St. Thomas' Hospital, in the City of Panama (of which institution I was the director), a patient of Indian extraction, of dark complexion, about 20 years of age, single, and a labourer by occupation. He was directed to my general surgical ward, where I saw him next morning.

History.

After a general investigation, I could ascertain no specific history or elicit no hereditary data of any consequence.

The patient states that three years back he was struck by a piece of coal in the left eye, and gives the history of a corneal ulcer, which healed after a time. This detail is of importance only because of the fact that at about the same time he noticed that the left eye began to protrude from the orbit. The growth had been developing, then, for about three years.



FIG. 1.

Examination.

The right eye was normal. $V. = \frac{20}{20}$. Emmetropia.

The left eye presented a very marked exophthalmus with a decided deviation directly downwards in a vertical plane, to the extent of about three quarters of an inch below the level of the right pupil, and a very small outward deviation as well (Fig. 1). The upper lid was very prominent, but without any inflammatory appearances, and it had the consistency of a lymphoma. The lower lid, on the contrary, was very much crowded and wrinkled. The palpebral conjunctiva was normal. The bulbar conjunctiva presented marked engorgement of its vessels, principally the veins, due to the compression. There was no loss of sensibility in any part of the organ. The cornea, iris, lens, and vitreous were normal. The optic disc was hazy, and presented marked vasodilatation, such as might be expected from compression.

$V. = 20/40$ with a very irregular astigmatism from his corneal opacity as well as from the change of form due to the compression. His sight was, however, most affected from the compression of the optic nerve. Motility: the eye was practically fixed in the orbit, permitting only very slight motion in every direction except upwards. Pupillary reaction to light, convergence, and accommodation was very sluggish.

Projection and orientation were correct, although sluggish. On palpation, the whole of the tumefaction of the upper lid was of an even consistency,

much like the resistance of a lymphoma. At the middle of the upper orbital margin, and lying rather within the orbit, I could feel a very small, hard, and unyielding projection, about the size of the little finger tip. This fact, together with the very pronounced exophthalmus, led me to believe that the tumour was of rather large dimensions and located principally posterior to the equator of the eyeball. The exophthalmus was not reducible by pressure, neither was any pulsation to be felt.

Diagnosis.

A tentative diagnosis was made of a fibroma or an enchondroma, or an osteoma, or perhaps a lymphoma, or, again, of some mixed benign form, as the patient had no pain, and no inflammatory symptoms. At no time, however, did I feel justified in making a definite diagnosis. To the rule, that surprises often await us in the diagnosis of orbital tumours, this particular case formed no exception.

Treatment.

Under general anæsthesia, and after routine surgical preparation, I proceeded to make a large curved incision down to the bone parallel to the



FIG. 2. The tumour, 5 cm. in length, $3\frac{1}{2}$ cm. in breadth, $2\frac{1}{2}$ cm. thick.

orbital margin and a little separated from the latter, extending from the inner angle to the outer. After careful dissection, I located beyond the orbital margin above a small encapsulated, rounded protrusion, which I followed by blunt dissection to the very apex of the orbit. I separated it from the muscles, periosteum, and optic nerve, and extracted it in its entirety. As may be imagined by its size (Fig. 2), it was necessary to dislocate the eye to an apparently alarming degree. Nevertheless, the globe assumed its normal position. Recovery was uneventful, except that upon removing the first dressing in twenty-four hours, I found considerable œdema of the

conjunctiva and a somewhat opalescent cornea, which I attributed to faulty circulation by reason of the conjunctival œdema, and which cleared up the next day after a few linear scarifications of the conjunctiva.

Macroscopic examination of the growth.

The photograph (Fig. 2) shows a roughly oval-shaped encapsulated tumour, almost as large as a hen's egg, measuring 5 cm. in length, $3\frac{1}{2}$ cm. in breadth, and $2\frac{1}{2}$ cm. in thickness. It lay horizontally from before backwards in the orbital vault with its small end forwards and four-fifths of its bulk posterior to the equator of the eyeball. Through a small rent in the capsule, I could detect the contents, which appeared like colloid granular material, with some very small globules, resembling epithelial pearls.

Microscopic examination of the growth.

The specimen was hardened in formaline, and all the microscopic sections were made from a wedge-shaped slice down to the centre.

Generally speaking, the tumour presented evidences of active degenerative change. The stroma presented a marked myxomatous degeneration towards the surface, whilst in the centre no such change was present. The stroma held together a variety of cells, or cell groupings, represented by the following types: vesicular cells; cellular nests; atypical vesicles; cellular "pearls;" and portions of hyaline or colloid material. The cellular nests are formed by large polyhedral cells somewhat similar to a squamo-cellular epithelioma. The centres of these nests present evidences of a more or less complete colloid or hyaline degeneration which readily took the eosine stain, and again at times an opal and orange-red tint, suggestive of *keratinization*. The cellular nests and the "pearls" were frequently surrounded by connective tissue, and at times by vesicular cells that differed very little in form and size from the nest cells, grading off gently towards the stroma cells with which they eventually grouped by changes of form and stain.

The colloid material was to be found also in the centre of the atypical vesicles, as well as in the nests.

The vesicles were covered by one or more layers of cuboid or flattened cells, which were identical with those of the nests and those which formed the greater part of the cellular element of the tumour. With a certain frequency there were to be found in the centre of colloid material groupings of concentric cells similar to epithelial cells.

In one large atypical vesicle was observed a granular coagulated substance with very few red cells, but with a considerable amount of desquamated endothelial cells.

There was only one fully developed blood-vessel to be found.

Taking all this into consideration, it is to be observed that there were three well-defined elements in this mixed neoplasm:

1. The myxomatous degeneration of the stroma.
2. The marked tendency of the cellular element to form cylindrical lymphatic channels which served as avenues of nutrition.
3. Its endothelial origin.

The fact of having these three distinct elements would justify the title of "Myxo-Lymphango-Endothelioma," which is a cylindroma.

Through the courtesy of Dr. Darling, of the Ancon Laboratory, a few sections were submitted to Prof. Welch, of the Johns Hopkins University, who was of opinion "that this tumour had probably originated

in an embryological rest; that it resembled very much such mixed tumours as are observed in the parotid gland; that the glandular element predominated, although there were present epithelial cells and myxomatous degeneration."

Result of Case.

I examined the case thirty days after operation, when the photograph (Fig. 3) was taken, with the result which you can judge for yourselves.

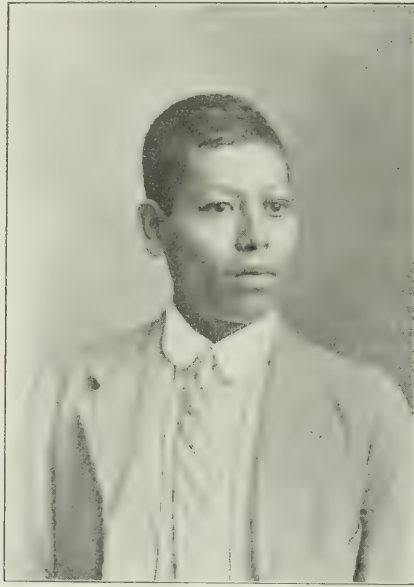


FIG. 3.—Thirty days after operation.

The functional examination was perfect, with the exception of the vision, which was 20/50, as was natural to expect owing to the optic nerve condition brought about by the tumour compression. The motility, convergence, etc., and æsthetic result, I believe, are unusually good.

After a lapse of two years, there has been no relapse, and the result has been uniformly maintained.

CLINICAL MEMORANDA.

A CASE OF CONGENITAL COLOBOMA OF THE LENS.

BY

M. SOBHY, M.D.,

CAIRO, EGYPT.

History.

PATIENT is a boy of about one year old. At the age of a few months, the child had boils on his body and limbs, and was nursed away from his mother. He had been always weak and anæmic. He was cured and taken again to his mother, who found that his sight had become defective. There is no history of syphilis.

Clinical description.

Both corneæ measure 11 mm. in their horizontal diameter. Right anterior chamber is of normal and regular depth. Pupil, dilated by atropine, measures from 8 mm. to 9 mm. in diameter. It describes a regular circle. There are no remnants of pupillary membrane. Anterior surface of iris, as seen by the *loupe*, does not show any abnormality. Iridodonesis has been observed once. By focal illumination (or by the ophthalmoscope) an opacity is seen deep in the centre of the pupil. Its contour shows minute dentations all round. The upper and outer half of this contour describes half a circle, its lower and inner half is formed of two lines which meet in an obtuse angle, the apex of which is directed downwards and inwards. Its dimensions are 4.5 mm. horizontally and 4 mm. vertically as seen through the cornea. By the same method and with the help of a magnifying glass a faint anterior capsular opacity is made out in the centre of the pupil. By transillumination, a dark and straight line is seen in the lower-inner quadrant, the fundus shining red on either side. This is the edge of the lens. The upper end of the line appears in the pupil at a few minutes to three o'clock, the lower end is seen at five o'clock. At one millimeter on the temporal side of this line and quite parallel to it runs a similar line which can be seen to merge into a circle of the same size as and coincident with the pupil. This represents the contour of a second lenticular opacity, very faint and concentric with the one already described. No vessels or strands are seen in the coloboma. The ciliary processes may be seen in the aphakic part. I could not affirm the presence or absence of the capsular ligament in the part corresponding to the coloboma. No coloboma of the choroid or of the optic disc is seen. Refraction has not been estimated on account of the lenticular opacity and the restlessness of the child. Curvatures of either cornea or lens could not be measured for the same reasons. The lens of the left eye, the opacity of which was complete, had been needled. No coloboma could be seen in that eye, the fundus of which could not be examined.

Interpretation of the Case.

The first question to decide is whether the case is a true coloboma or a mere subluxation of the lens having such a clinical appearance. The equally deep anterior chamber, the outer opacity being concentric with the pupil, and the fact of the edge of the coloboma being a straight line and not a curved one, all speak in favour of a defect in the edge of the lens.

In colobomata we distinguish two types: congenital and acquired. A case of the latter type was observed in a patient of eighteen years old, who had iridectomies done on both eyes at the age of two years. Colobomata corresponded to the iridectomies on either side, and were absent shortly after the operation (Isakowitz¹).

Wessely² in his experiments obtained similar results. He did iridectomies on newly-born rabbits soon after the lid fissure was opened (which occurs in the first week). He noticed some days after the operation (not earlier than the sixteenth day) that in each case slight indentations of the edge of the lens corresponding to the place of the iridectomies were formed. These indentations increased in size slowly and gradually. Our case is surely a congenital one, as no operation whatever has been done on the eye.

The peculiarity of the case lies in.—(1) its rarity. Böck³ recorded one case of the straight line type amongst eighteen of the other more common forms. (2) Its being unaccompanied with a coloboma of the other tunics—50 per cent. of the cases reported in the literature are accompanied with such

colobomata. (3) Its position, being on the nasal side and not corresponding to the foetal cleft. Toldt,⁴ under Fuchs, collected seventy cases of lens colobomata, two of which were on the temporal side, five on the nasal side, twelve upwards, and fifty-one downwards.

Before discussing the pathogenesis of the case, a glance at the development of the zonula and its influence on the growth and the shape of the lens may be advisable. The experiments of Wessely² show that the capsular ligament plays an important rôle in the production of defects of the lens. He was able to demonstrate after sectioning the eyes experimented upon, that the ligament was either stretched, rarified, or affected with minute holes in the places corresponding to the iridectomies. In one of his experiments he made only a puncture through the ligament, which was followed by a scar at that place. Curiously enough, the edge of the lens protruded in the form of a knob at that place.

E. T. Collins,⁵ in his article on the subject of the development of the zonula, said that before the growth of the vitreous body, adhesions formed between the inner layer of the secondary optic vesicle, at the place from which developed the ciliary body, and the perivesicular sheath at the equator of the lens. As the ciliary body grows away from the lens, these adhesions stretch and the zonula is thus formed. He could demonstrate, as well, the presence of nucle on the stretched fibres, showing the cellular origin of the latter. Now, anything hindering the occurrence of such adhesions, like the persistence of shreds of the perivesicular sheath, late closure of the foetal cleft, or causes discussed later, etc., interferes with the normal development of the zonula in that place and necessarily with that of the lens. The absence of remnants of the perivesicular sheath and the atypical position of the coloboma lead us to think of other factors. Many of the cases reported were complicated with some sort of cataract. Our little patient has a perinuclear one in right eye and a complete cataract in the left one. Might not the cause for both lesions, *i.e.*, coloboma and cataract, be the same (a constitutional disease?) Let us see how far this theory will hold good. The diameter of the opacity, magnified by the cornea, measures from 4 to 4.5 mm. The real size is a little bit less than 4 mm., say, 3.5 mm. The last figure corresponds to the size of a lens of a 4 months' foetus (see Collins' ⁵ table), a time at which the zonula develops. The cause which acted on the peripheral cells of the lens giving rise to perinuclear cataract might have acted at the same time on the cells from which the zonula originated, giving rise to its malformation.

I am indebted for the preceding case to the exceeding kindness of Professor Hofrat Dr. E. Fuchs, of Vienna, who, when I had the honour of working under him, authorised me to publish it.

REFERENCES.

1. Isakowitz.—"Linsen Kolobom nach Zonulariss." *Archiv für Augenheilkunde*, Bd. LIX, S. 372, 1908.
2. Wessely.—"Versuche am wachsenden Auge. Ueber experimentellerzeugte Linsen Kolobom." *Archiv für Augenheilkunde*, Bd. LXV, S. 295, 1910.
3. Bock.—"Colobome du cristallin." *Encyclopédie française d'Ophtalmologie*, T. II, p. 306, 1905.
4. Toldt.—Deutschmann's *Beiträge zur Augenheilkunde*, Bd. V. S. 39, 1902.
5. Collins, E. T.—*Royal London Ophthalmic Hospital Reports*, Vol. XIII, p. 81.

FOREIGN BODY IN THE ORBIT: REMOVAL AFTER TWO YEARS.

BY

HANFORD MCKEE, M.D.

ASSISTANT SURGEON TO THE EYE AND EAR DEPARTMENT OF THE MONTREAL GENERAL HOSPITAL; OCULIST TO THE MON REAL MATERNITY HOSPITAL; OCULIST TO THE ALEXANDRA HOSPITAL; DEMONSTRATOR IN OPHTHALMOLOGY AT MCGILL UNIVERSITY.

FOREIGN bodies enter the orbit usually between the globe and the roof, and generally nearer the inner than the outer angle. There are cases on record of large foreign bodies being lodged in the orbit without the patient's knowledge. If the body be aseptic, there seems to be no reason why it should not remain there for an indefinite period. It is often extremely difficult to locate foreign bodies in the orbit. This is true even of large bodies, and where one has the assistance of the X-rays. The latter with certain objects, such as some kinds of glass and wood, does not give us much assistance. The point of entrance is often small, and closes quickly. The most constant symptoms are displacement and limited movement of the eyeball. These are often followed by disturbance of vision.

Some time ago, a young man, D.H., aged twenty-four years, came to consultation for "a swelling of the right eye." He gave the following history.—Twenty-six months previously, while riding home after dark, he struck a spruce bough with such force that a piece of it entered his eye. The patient removed this twig immediately, and when he arrived home, about half an hour later, went to the family physician, who cleansed and dressed the wound. Healing took place quietly in about a week. Two to three weeks later, the eyeball began to swell, and from that time to date, the process has been one of swelling relieved by discharge, again to be followed by swelling. This has now been going on for over two years, and has lately become such a nuisance that it has incapacitated him for work.

Upon examination, the right eye was seen to be displaced forwards and outwards. With the lids closed, only two-thirds of the cornea was covered. One half-inch to the outer side of the inner canthus, and just above the middle level, a sinus was found, from which thick, white pus was discharging, a staphylococcus albus infection. With a small probe, one could follow the sinus backwards for one and a half inches. It was noted that the sinus was very narrow. The examination with X-rays failed to demonstrate the presence of a foreign body. Examination of the nose and accessory sinuses by Dr. H. S. Birkett was negative. Although two attempts had been made in other cities to locate the foreign body, and although we were never able during many attempts with the probe to reach anything which we thought was a foreign body, we nevertheless believed that the discharging sinus was due to some of the spruce branch having been left in the orbital cavity.

Dr. Birkett was good enough to assist me, and, under ether, a Killian incision was made, and the orbit explored. We found an opening in the inner wall of the orbit corresponding to the middle meatus of the nose, near the ethmoid cells, and just at this point a drop or two of pus. The inference was, that perhaps the foreign body had made its way through the lateral wall of the orbit into the ethmoid cells. The line of incision healed by first intention. The sinus closed, and remained so for a week, when it began discharging again. One week later the opening was enlarged, and by means of sinus-forceps the canal was gradually dilated. With this space dilated, we were able to put a pair of thin forceps to the bottom

of the sinus, and after some time, found the foreign body lying horizontally. This was removed after some manipulation, and found to be half an inch long and an eighth of an inch wide in the thickest part. A tube was inserted. The operation was followed by a very severe reaction. The sinus closed and the swelling quieted down, allowing the patient to leave the Hospital ten days after the operation. His vision, with correction, was normal. Three months later, in answer to my enquiries, he wrote that his eye had given him no further trouble, and was as well as it had ever been.

There are numerous cases in the literature of foreign bodies in the orbit for a considerable period. Unfortunately in many of these cases where a suppurative process has gone on, as in this case, blindness has resulted, from orbital cellulitis or inflammation of the optic nerve. This case seemed of interest to us because of the length of time the septic body was lodged in the orbit without damage to the visual organ.

NOVELTIES.

THE NEW SCLERECTOME*

BY

PERCY C. BARDSLEY, M.A., M.B., B.C.

LONDON, ENGLAND.

This instrument consists of two parts :—

- (a) A narrow bladed keratome, with a hole drilled through the blade.
- (b) A punch attached to the handle of the keratome (worked with a lever and ratchet) which descends into the hole.

A conjunctival flap is turned down to the cornea and drawn over the cornea in the usual way. The keratome blade is inserted through the sclera into the



anterior chamber, and pushed forward till the piece of sclera in front of the cut comes under the punch. The lever is then pressed by the first finger and the punch removes a circular piece out of the sclera, which remains in the hole of the keratome blade and is withdrawn with that blade. A peripheral iridectomy can now be done if desired (and, in my opinion, should always be done) through the keratome opening. The conjunctival flap is then replaced. In the earlier models, the sclerectome was a *right-angled* keratome with a punch. The present instrument is a very great improvement on the former.

It is very much easier to manipulate; in fact, it is as easy as an ordinary keratome. The right angled keratome needed a little practice, and I once saw a surgeon, at his first attempt, pass the point between the split layers of

*Demonstrated at the Ophthalmological Society of the United Kingdom, July 10th, 1912, and at the Oxford Ophthalmological Congress, July, 1912.

the cornea. But any one accustomed to use a keratome can use the latest model without fear. (Personally, I use the thumb and second finger to grip the handle, reserving the first finger to press the punch, when in position.) When the keratome has been inserted, the punch cuts down on to a solid fixed base; therefore the trephine cannot wound any other tissue than that intended.

The base does not rise up as in various earlier patterns of scleral punches. The only care that need be exercised in punching is to see that the conjunctival flap is thrown well out of the way. With this instrument, absolute security from losing the punched-out section in the anterior chamber is guaranteed. This unpleasant incident happens to all of us, sooner or later, when using the ordinary trephine; but in the manufacture of the sclerectome, Messrs. Down Bros. have made certain that this shall never occur.

After the punch hole has been cut, I think, myself, that a peripheral iridectomy should invariably be performed. I believe many failures have been due to unrecognised adhesions at the root of the iris.

In secondary glaucoma due to iritis, this double purpose instrument, has been especially useful. In all cases, its use shortens very much the length of the operation.

Objections were at first raised to the supposed difficulty in resharpening the sclerectome. Now, after prolonged experience, I can state that the keratome blade remains sharp for a great number of operations, and the cutting "life" of the punch is almost limitless, supposing ordinary surgical care be exercised.

Messrs. Down Bros. will reset the keratome blade at any time, exactly as any other keratome is reset.

In conclusion, I would point out that the instrument can be taken to pieces by withdrawing the one mill-headed screw, and can be boiled, either as a whole or in parts. In my own practice, I boil my cutting instruments only on very rare occasions.

REVIEW.

PTOSIS.

BY

HAROLD GRIMSDALE, M.B., F.R.C.S.,

OPHTHALMIC SURGEON TO ST. GEORGE'S HOSPITAL, LONDON, ENGLAND,

ETC., ETC.

PTOSIS, or as it is sometimes called, blepharoptosis, is not a disease but a symptom. In ptosis, the lid droops, and cannot be raised normally by the normal muscles. Another condition, which is sometimes included under the name, is the falling of a fold of skin over the lashes (blepharochalasis); this is more properly called a false ptosis. In true ptosis not only the skin, but also all the other tissues of the lid concur in the drooping. In blepharochalasis, with which we shall have more to do later, the large fold of skin is freed by an abnormal want of connection between the skin and the underlying tissues, and perhaps by the atrophy of the orbital fat.

True ptosis depends in some way on the insufficiency of the elevating muscles. The upper lid is raised by the combined action of three muscles, of which one is by far the most important. This, the levator palpebræ superioris,

arises from the back of the orbit, just above the origin of the superior rectus, of which it is morphologically part, and passes forward through the orbit; it becomes tendinous about the level of the equator of the globe and spreads out into a broad aponeurosis, which, piercing the orbital septum, is inserted by several bands, into the skin. These bands, as they go to the skin, pass between the fibres of the orbicularis palpebrarum. Behind the septum orbitale, the muscle gives off a fairly strong fascicle of tendon which goes to be inserted in the cul-de-sac of the conjunctiva, and as the muscle passes through the orbital septum, its sheath becomes blended with this, and, enforced by certain unstriped muscular fibres, passes on and becomes connected with the upper edge of the tarsal plate (Müller's muscle). The muscle is thus attached to every structure of the lid.

Besides this, the chief elevator, there are, as already said, two accessory muscles: the superior rectus, which gives a fascicle from its tendon to join the tendon of the levator, and the frontalis which, by wrinkling the skin of the brow, pulls on the upper lid and helps to raise it. The latter is constantly called into play when, in surprise or fright, we make an involuntary effort to open the eyes as wide as possible. And in certain diseases we may notice the frontalis in unusual action, when the patients are trying to allow as much light as possible to enter the eye. For example, in some cases of optic atrophy, and in retinitis pigmentosa, the elevation of the brow, by the action of the frontalis, gives a somewhat characteristic staring look.

The attitude adopted by patients who suffer from congenital ptosis is quite different from this, for in their case the wrinkling of the forehead is combined with a backward version of the head.

The diagnosis of ptosis is easy. There are few things with which it can be confused. But there are a certain number of conditions which are sometimes grouped together under the title of "false ptosis," which merit a few words of separate description.

In true ptosis there is a drooping of the upper lid; which can be raised by the smallest exercise of external force, but, if the ptosis be complete, not by any voluntary effort of the patient.

Closure of the lids from the spasmodic contraction of the orbicularis might conceivably give rise to a slight difficulty in diagnosis, but to the ophthalmic surgeon who is accustomed to note the appearance of the folds of skin round the eye—those folds which show the action of the underlying muscles—spasm of the orbicularis is rendered obvious by the absence of the horizontal wrinklins of the forehead as well as by the presence of small vertical folds in the region of the eyebrows. The lower lid, also, is raised and wrinkled in spasm, while in true ptosis, it remains lax and smooth.

There is a condition, so-called "pseudo-paralytic ptosis," which seems to be closely allied to blepharospasm, but has some special features. In this condition, which was described by Charcot and Parinaud, the upper lid falls as in true ptosis, and the lower lid is not raised, while if the patient be directed to open his eye, he throws the frontalis violently into action, as is shown by the horizontal wrinkles of the forehead; but, and this is the special diagnostic point, the eyebrow on the affected side, is not raised by the frontalis, although this muscle appears to be in strong action in the various forms of false ptosis, especially in blepharochalasis.

In blepharochalasis the skin of the fold of the upper lid is so redundant that it falls over the eyelashes, and conceals the true lid margin. The first description of the condition was given by Fuchs. He described, in the *Wiener medizinische Wochenschrift*, the thin and wrinkled skin, red with numerous small veins, which characterises this affection. The study of this malady was

continued by Lodato in the *Archivio di Ottalmologia* for 1903, and by Scrini and Terson in the *Archives d'Ophthalmologie*.

Although the disease is fairly well known clinically, there is little certain about its pathology. Terson considers it to be essentially a lesion of the sympathetic, and in some way due to an imperfect innervation of the unstriated muscle fibres which attach the tendon of the levator to the skin. Others consider it due to a want of elasticity of the skin itself. There is some evidence to show that it may be increased, if not actually occasioned, by repeated attacks of œdema of the lids. In fact, the condition which was called by some surgeons, "recurrent œdema of the lids," seems to be the early stage of the blepharochalasis. The condition is closely allied to the "ptosis adiposa" of Sichel; some surgeons, indeed, consider them to be identical.

Ptosis is due most commonly to some insufficiency of the muscle for its proper task. This may depend on some alteration in the nature of the work, or on some alteration of the nervous or muscular mechanism. The nature of the work is altered in various ways; thus, for example, in trachoma, the whole lid is thickened and stiffened, and there is difficulty in elevation. Similarly, in cases of hyperplasia, the muscle is overtasked. Again, after long-continued blepharospasm, such as often occurs with corneal ulceration, slight ptosis may persist long after the ulcer is cured, either because the orbicularis keeps up some spasm, or because during the period of spasm, the levator has been stretched and has never recovered tone.

In some instances, also, the falling back of the eye into the orbit, enophthalmos, puts the muscle into a faulty position for its work, and some drooping is a necessary result.

These forms are, for the most part, of small importance, at least from the point of view of the ptosis, and therefore we need not delay over them, but may pass on to the more important branch of the subject in which we have to deal, namely, with the forms of ptosis due to some abnormality of the muscle itself or of the nervous mechanism governing it.

Congenital ptosis.

Congenital ptosis is met with either as an isolated or as an hereditary condition. The isolated cases may sometimes be ascribed to injury at birth. The non-traumatic hereditary cases are almost always bilateral, but one side is usually affected to a greater extent than the other. The appearance of patients suffering from congenital ptosis is characteristic.—The forehead is thrown into marked transverse folds by the action of the frontalis; this wrinkling lifts the eyebrows and pulls on the skin of the lid, lifting it so that the margin rises above the lower edge of the pupil. If the loss of power in the levator be complete, the head will be thrown back, so as to allow the eyes to see under the drooping lid.

Not uncommonly there is some defect of development of other muscles about the eyes. Occasionally, there is defective development of all the facial musculature, with marked epicanthus, and want of facial expression—a condition which has been spoken of as "mask-like epicanthus."

Allied to these defects, which are probably due to defective nerve-development, are those cases of associated movement of the lids and jaws which were first described by R. Marcus Gunn. In this condition there is very commonly a slight degree of ptosis.

In one or two cases, there have been opportunities of examining the anatomical conditions which are at the bottom of these defects. For example,

in a case of double congenital ptosis, Wilbrand and Sanger examined the brain after death and found an aplasia of the nucleus of the third nerve. "As regards the nucleus of the third nerve," they say, "we found on the right side a marked diminution of the number of the ganglion cells, especially in the lateral large-celled nucleus. There were no signs of inflammatory or degenerative processes, and this alteration must therefore be regarded as a want of development of the ganglion cells, especially marked in the region named. In a less degree, the same want of development could be observed in the Westphal-Edinger nucleus of the left side." The ptosis in this case, as shown by the photographs which accompany the description, seems to have been partial only. It is difficult, however, to explain how the lesion accounts for the equal double ptosis.

The diagnosis of congenital ptosis is usually easy. The appearance of the patient and the history are enough to make it clear at once. When the early history is missing, it is not at all certain, in some cases at least, whether we have to deal with a congenital condition, or with a very slowly progressive degeneration of the nuclei, which may lead eventually to ophthalmoplegia externa.

When there is congenital defect of the musculature of the eye combined with ptosis, the question of prognosis is most important. There are one or two points to be borne in mind that will help us. In congenital defects, there is never secondary contraction, nor do the patients complain of diplopia. In paralysis of the third nerve, there is always some secondary contraction, eventually, and almost always diplopia.

Acquired Ptosis.

Paralytic ptosis, as the result of a nervous lesion, is a comparatively frequent symptom, and is occasioned by an almost infinite number of lesions. It may present itself as an isolated symptom, or may be combined with other defects. It necessarily accompanies the paralysis of the ocular muscles which follows any extensive lesion of the third nerve or its nucleus. It is, to some extent, an advantage to the patient in these conditions that the eyelid should droop, since it prevents a diplopia and false projection which would be often most troublesome.

It is rarely, therefore, that we are called upon to treat this form of ptosis, even if the paralysis be permanent, except as a part of a nervous disease. Surgical treatment is out-of-the-question; treatment by drugs involves the accurate investigation of the various diatheses which may predispose to the pareses.

It will be found most commonly that the paralysis is due to syphilis, or to some para-syphilitic nervous disease. Not very uncommonly, however, we meet with ptosis and paralysis of the ocular muscles, associated with severe headache, the so-called ophthalmoplegic migraine. This last disease is characterised by its recurrence. The pathology is obscure, although in one or two cases examination after death has shown some pressure, as from tumour or other cause, on the third nerve.

Hysterical ptosis is a somewhat rare condition. When it occurs, it simulates true paralytic ptosis very closely, both in the appearance and action of the surrounding muscles. It has been pointed out that it is often easy to make a diagnosis, by telling the patient to fix an object in the normal position of ptosis, with the head well thrown back and then pressing the head gently

forward. In the paralytic condition, there will be no movement of the lids and the object will be very soon lost to view, as regards the patient. In hysterical ptosis, the patient unknowingly follows the object with head and eyes into a region which would be impossible if the muscle were really paralysed.

The existence of an isolated ptosis, as the result of a cortical lesion is still a subject of dispute: Horsley and Schäfer, in their well-known experiments on monkeys, seemed to find a region, in the first and second frontal convolutions, which stood in the same relation to movements of the eyes as the various parts of the Rolandic area stood to the movements of the other parts of the musculature.

Landouzy and Grasset, in the first place, and later a number of other observers, have recorded cases in which a cortical lesion has been connected with an isolated ptosis.

It seems accepted that in man, to no area of the cortex can be assigned a special command over the ocular movements. We have therefore to limit our enquiry to the point whether there is a region which governs the movements of the upper lid.

When we examine the various cases which have been recorded, we cannot fail to be struck by two facts: one is, that although the majority of the cases showed a lesion somewhere about the angular gyrus, others, in which the ptosis seemed equally an isolated symptom, showed lesions in the most varied places, *e.g.*, the island of Reil, the temporal convolutions, and even the cerebellum. On the other hand, we have the equally certain fact that many lesions of the angular gyrus (and this is the region most generally accepted as the seat of the centre), occur without any sign of paralysis of the levator palpebræ.

It is rash for the ophthalmic surgeon to offer an opinion on a matter which is obviously a problem for the neurologist, but taking into account the facts already mentioned, and, further, the tendency which is now marked among physiologists, to make the cortical centres less definite—to throw doubt on the beautiful maps of the Rolandic area which we were all taught—I think we shall do well to hesitate to call any ptosis "cortical," and to regard these cases as indicating some disturbance of the associating mechanism.

A form of ptosis, with no other paresis, is sometimes seen in old people. It attacks women especially, and seems to be unconnected with any other nervous lesion. In a case recorded by Fuchs, the excision of a small piece of the levator, at the time of operation, allowed a microscopical examination of the muscle to be made and revealed a condition like that of progressive muscular atrophy. Kunn believes that the morbid process of this disease (which usually avoids the ocular muscles) can, under certain conditions, attack them only.

On the other hand, there has been recorded in one similar case a multitude of capillary hæmorrhages in the nucleus of the third nerve. Paralysis of the sympathetic is sometimes associated with drooping of the upper lid, and this symptom is found in other cases of enophthalmos, from whatever cause occurring. In lesions of the sympathetic there are two factors in the ptosis: the first, is the loss of action of the unstriated fibres which run in the fold of fascia from the tendon of the levator to the upper edge of the tarsal plate,—the so-called Müller's muscle—and the second is the backward displacement of the globe; this, by removing the normal prominence of the lid, impairs the action of the levator. A point which will enable us to distinguish, in case of doubt, between the enophthalmos belonging to lesion of the sympathetic and

that due to other causes is the persistence of action in Müller's muscle. The instillation of cocain into the affected eye will stimulate the sympathetic, and if this is still active, will be followed by slight elevation of the lid from contraction of these unstriped fibres, while if the sympathetic is paralysed, there will be no retraction.

The levator is not the only muscle affected in cases of enophthalmos; all the recti are involved also, and all movements of the globe, therefore, are lessened. It has been suggested that in these cases the normal prominence of the globe may be regained by a tenotomy of all the four recti. This will do away with the ptosis, but it will not improve the motility of the eye equally in other respects. If vision is good in the affected eye, there will follow very troublesome diplopia; usually there is grave defect of vision, and this fear, therefore, need not disturb us.

As ophthalmic surgeons, however, our problem is rather the surgical treatment of ptosis than the solving of the recondite nervous problems involved in the diagnosis of some of the more obscure forms.

We may therefore leave these to the neurologist, and begin to discuss the points concerned in the surgical correction of the deformity.

The first question which the ophthalmic surgeon has to consider is whether the ptosis is permanent; so long as there is any reasonable chance that the nerve structures are not irretrievably damaged, there is always hope that recovery may follow. At this time any operative interference would clearly be inadmissible, and more likely to be followed by harm than good. There is no certain test, so far as I am aware, which will decide whether the damage is permanent or only temporary, and the surgeon must use his clinical judgment in deciding, with the help of the time that the paralysis has lasted and the nature of the cause, whether he is justified in undertaking an operation for relief or not.

In congenital ptosis the points which must largely rule our judgment are two: the uni- or bilaterality of the ptosis, and the presence or absence of some power in the levator. The first can be decided at a glance; the second with almost equal ease.

If the eyebrow of the affected side be depressed by the surgeon's finger, so as to prevent all effort of the frontalis, any movement of the eyelid which follows an attempt of the patient to look up must be due to the intraorbital muscles. Since the action of the rectus is little, the movement may be, with little error, assigned to the levator.

The presence of other muscular abnormalities—paresis of the recti or obliqui—is of less importance in the congenital than in the acquired forms of ptosis. Congenital abnormalities of the muscles, although they involve loss of parallelism of the visual axes, are rarely the cause of diplopia; we have already mentioned this fact. It seems as if the growing brain were able to develop a power of binocular vision in any degree most convenient to itself.

But if this power of binocular vision is once fully acquired, it is very rarely lost, and hence in acquired ptosis due to paralysis of the third nerve and associated with paralysis of some other ocular muscle, diplopia persists when the corneæ are uncovered, even though the paresis is of long standing.

If, therefore, by operation, the surgeon raise a paralysed drooping lid in a patient whose other eye is normal, he must be prepared to find his patient little grateful, since the patient is likely to be greatly inconvenienced by the diplopia and false projection.

We may now pass in review the main methods of operating and criticise them turn by turn.

Operations for Ptosis.

Among the multitude of methods which have been devised to deal with ptosis, it is difficult to trace a short and easy way. There are, however, certain outstanding principles which will help us in gaining a general outlook.

The main groups into which the operative procedures fall are three in number :

1. Those operations which rely on shortening of the lid.
2. Those operations which call in the aid of the frontalis.
3. Those which evoke the aid of the superior rectus.

Of these various groups, the importance is not equal. The first consists of two forms of operation, the oldest of all, in which the lid margin or the skin is removed until the pupil is uncovered, and these are all radically bad, and the second subdivision, containing those procedures in which the tendon of the weak levator is advanced.

If the ptosis be incomplete, and there be some power in the levator, **advancement of the tendon** is a correct and surgical procedure. There are various ways of performing this operation ; that of de Lapersonne appears the simplest and most efficacious. He makes, first, an incision, about 5mm. above the free edge of the lid, in its whole length, dividing skin and orbicularis. He dissects back the lips of the wound, exposing the tarsal plate, the orbital fascia, and the insertion of the levator. In the second stage, he makes an incision through the orbital fascia, on each side of the tendon, just above the tarsal plate, and passes a squint hook under the tendon. He then takes a doubly-armed suture, and passes each needle through the tendon near one edge from before backwards, at a little distance from the hook, selecting his point with regard to the amount of effect desired, and separating the needles by a distance of two millimeters. A second similar suture is passed through the tendon near its other edge ; then the needles are made to tunnel through the tarsal plate vertically for a short distance, the points of entrance and exit being in the same horizontal line. After this, the tendon and overlying orbital fascia, is cut through and the sutures are tied ; this, fixing the attachment to the anterior surface of the tarsal plate, shortens the muscle. Sometimes, if a large effect be required, de Lapersonne removes a piece of skin and orbicularis.

The second group contains a very large number of different methods, but they all agree in this point, namely, that the frontalis is employed to assist in raising the lid.

The earliest of these operations aimed at making an artificial tendon of scar tissue attaching the lid to the frontalis. An improvement on this is the operation of Mules and the variations thereof. In this a gold wire is passed to form a loop which takes hold by its upper end of the frontalis and by its lower of the tarsal plate.

Mules' operation is very simple :

1. An incision in the lid margin some 5 or 6 mm. long, and about 3 mm. deep, rather behind the grey line. Just above the eyebrow a puncture through skin and frontalis, opposite the centre of the marginal incision.
2. The passage of the gold wire by means of a special needle. The needle is passed downwards from the puncture to one end of the incision on the lid margin, the eye at the point filled with the gold wire and the needle and wire withdrawn.

The needle is unthreaded, and passed again from the puncture to the other end of the marginal incision. Here it is again threaded with the other end of the wire and again withdrawn.

This leaves a loop of wire embedded in the lid margin; the lid is raised as much as required, the ends of the wire are twisted and buried under the skin at the puncture.

This little operation has several advantages. Thus, it is easy of performance, and entails a short disability only on the patient; the wounds heal within a few hours, and the patient can resume work with very little delay.

Against it has been urged that it has caused entropion, in some cases; this I have never observed: that the wire gives rise to constant tenderness; this is rarely seriously inconveniencing to the patient; and, finally, that the wire may break; this last accident has not, I think, been recorded.

Of the various operations for the relief of ptosis, which may be called plastic operations, **that devised by Panas** is probably the best known. In this operation a bridge of tissue is dissected up in the region of the brow, and a square flap of the skin of the lid passed under this bridge and fixed to the frontalis above the primary incisions. In this form the operation is frequently followed by ectropion, because the tension on the skin is unduly great, and Panas counteracts this by means of secondary sutures which attach the orbital fascia to the frontalis; in this way the ectropion is avoided, but the operation is not entirely free from disadvantage. The epithelial surface of the skin "tendon" flap is in contact with the raw under-surface of the bridge, and a pouch results which cannot heal by first intention, and which therefore involves a comparatively prolonged disability for the patient. The eventual deformity is very small in those patients whose cases I have been able to watch.

A less-known, but perhaps better, operation, is that of Freeland Fergus.

Fergus's Operation:

1. An incision in the brow about $1\frac{1}{2}$ inch long; upward dissection from this to expose the surface of the frontalis, and downwards to lay bare the tarsal plate, almost to the lid margin.

2. A flap of the frontalis is dissected up, about $\frac{3}{4}$ inch broad and as long as the upward dissection permits; if possible 2 inches. The flap is attached to the general muscle by its posterior extremity only.

3. The flap of frontalis is fixed by sutures to the anterior surface of the tarsus.

It would seem that this operation would obliterate the normal fold of the lid, but the photographs, which accompany Fergus's original paper, show very good cosmetic results.

In old paralytic ptosis, where the levator remains as a tendinous or fibrous band, we may make use of its attachment to the lid and bring the tendon of the levator into conjunction with the frontalis. Some such operation as that of Sourdille is easy to perform, and gives satisfactory results:

By utilising the tendon of the levator, we ensure that all the parts of the lid are raised in normal ratio.

Sourdille's Operation:

1. An incision, $1\frac{1}{4}$ in. long, curved so that its extremities are well below the brow and its centre a little above it. This goes through skin and fronto-orbitalis. The flap thus marked out is dissected back and the orbital fascia exposed. A small pocket is made under the frontalis.

2. An incision through the orbital fascia close to the bony attachment. The fat which presents through the opening is pushed on one side and the tendon is soon seen; it is picked up on a squint hook and brought out of the opening in the orbital fascia.

3. Sutures are passed, and, after division, the tendon is fixed to the deep surface of the frontalis.

It is clear that all operations which depend on the action of the frontalis are faulty in this respect, that they do not attempt to replace the co-ordination between the movements of the lid and globe, which is so marked a feature of the normal condition.

By harnessing the frontalis to the lid, we can only ensure that the pupil is uncovered when the eye is at rest, and that the sufferer can, by special effort, raise the lid still higher, if necessary.

On the other hand, when we have called in the superior rectus, we have re-established a co-ordination between the movements of the lid and eye, which is as close as, or even closer than, the normal connection.

Normally, as is well known, the eye and lid move together in the waking hours; this movement is closely imitated after such an operation as that of Motais. But in sleep, and when the eye is closed for protection this common movement is not carried out; the eye is rotated up, while the lid falls down.

This relation is upset, if the superior rectus be attached to the lid as well as to the globe; there is another consideration which must weigh with us in this connection. The muscles that move the eye are very accurately adjusted to their task; their relation is easily upset and their margin of variation small; how small this is, we see frequently, when we examine the ocular causes of headache. A hyperphoria of two prisms (refracting angle) will often give rise to intense headache, which will disappear on correction.

The operations under mention, which like Motais's, add elevation of the lid, to the task of the superior rectus, are likely to be followed by some disturbance of movement.

This is not so important when both eyes are affected, but if one only is affected all upward rotation is likely to be associated with disturbance of movement, and, perhaps, with double vision, nausea, and headache.

Motais's Operation :

1. The upper lid is everted, and drawn upwards; the globe of the eye is drawn downwards, so to expose the cul-de-sac.

A horizontal incision is made through the conjunctiva over the insertion of the superior rectus; and a vertical from this first incision back over the middle of the muscle, as far as the fornix. The flaps are dissected up and the tendon is exposed.

2. A squint hook is passed under the tendon, and the middle third (or, as Sydney Stephenson has suggested, the outer half) is isolated by incisions; a doubly armed suture is passed from before backwards through the tendon; this may be passed before the flap is separated; the silk loop serves to maintain hold of the tendon.

3. An incision is made through the orbital fascia, and the anterior surface of the tarsal plate cleared by slight dissecting from this incision.

4. The flap of tendon is fixed to the anterior surface of the tarsal plate. The sutures are made to perforate the tarsal plate and tied on the conjunctival surface, or are carried down in front of the tarsus and made to emerge on the skin near the eye lashes. This latter method does away with the irritation set up by the rubbing of the knot against the cornea.

II.—GUIDE TO THE MICROSCOPIC EXAMINATION OF THE EYE.

(Continued.)

BY

PROFESSOR R. GREEFF,

DIRECTOR OF THE UNIVERSITY OPHTHALMIC CLINIQUE IN THE ROYAL CHARITY HOSPITAL, BERLIN,
WITH THE CO-OPERATION OF

PROFESSOR STOCK
(FREIBURG)

AND

PROFESSOR WINTERSTEINER
(VIENNA)

TRANSLATED FROM THE THIRD GERMAN EDITION,

BY

HUGH WALKER, M.A., M.B., C.M.,

OPHTHALMIC SURGEON TO THE VICTORIA INFIRMARY, GLASGOW.

Iris and Choroid.

The layers of the iris are best studied in meridional sections through the anterior half of the eye. Staining should be performed with carmine, since, especially in the case of a dark iris, the blue colour of hæmatoxylin does not offer sufficient contrast to the pigment. A layer of endothelium can be demonstrated on the anterior surface of the iris (Fuchs). A fresh eye is taken, and the sclera is divided behind the ciliary body. The anterior portion of the sclera and the cornea are then detached, so that the iris is fully exposed. The specimen is rinsed in water, and stained with drops of a 1 per cent. solution of nitrate of silver. Having been slightly hardened in weak alcohol, the iris is separated at its insertion. The posterior pigment layer is now brushed away, and after thorough dehydration, the iris is mounted in dammer with its anterior surface uppermost. (Fuchs, "Beiträge zur norm. Anatomie der menschlich. Iris," *von Graefe's Archiv*, Bd. XXXI, Heft iii.)

Special interest attaches to the posterior layers of the iris. These can only be studied in the eyes of albino animals and of embryos; otherwise the iris must be depigmented in the manner already described. The Dilator Pupillæ and the double epithelial layer on the posterior surface should be examined. The aspect of the latter varies according as the pupil is dilated or contracted, just as the appearance of the epithelium lining the bladder is influenced by the degree to which the organ is distended (Grunert, Greeff).

The pupil is contracted by most hardening media, and it is not easy to fix it in the condition of mydriasis. To secure this, Heine recommends that the eye be fixed in Flemming's solution in the incubator at a temperature of 40° C. (L. Heine, "Physiol.-anat. Untersuch. u. d. Accommodation des Vogelauges," *von Graefe's Archiv*, Bd. XLV, Heft iii.; Grunert, "Der Dilator Pupillæ d. Menschen," *Archiv für Augenheilkunde*, Bd. XXXVI, S. 319.)

Nerves.—The extremely delicate network is best demonstrated in the eyes of albino rabbits by the Ehrlich-Dogiel Methylen Blue Method. The eye is enucleated immediately after death, and a small quantity of 1/20 per cent. solution of methylen blue is injected into the anterior chamber by means of a hypodermic syringe. After 3-5 minutes the eyeball is bisected along its equator. The iris is then carefully detached from the limbus corneæ, spread out on a slide, and divided into four segments. It is now advisable to pour a

few drops of the staining solution over the specimen, and to place it in the incubator at 37° C. for 10 or 15 minutes. The maximum effect is by this time usually obtained, and the staining process must be interrupted (Andogsky, "Zur Frage über die Ganglienzellen der Iris," *Archiv für Augenheilkunde*, Bd. XXXIV, S. 87).

Cross-Sections of the Choroid. Staining with carmine.

Teased Preparations.—The choroid is teased, and the pieces preserved in glycerine diluted with water. In this way may be exhibited the pigment epithelium, the branched pigment cells of the stroma, elastic fibres, pieces of the lamina vitrea, and portions of larger vessels and capillaries.

PIGMENT CELLS.

The pigment cells can be beautifully demonstrated by excising a piece of hardened choroid, and mounting it unstained. Alcohol. Oil. Canada balsam. The inner surface with the pigment epithelium is placed uppermost. On focussing the microscope for the upper layer the delicate hexagonal cells of the pigment epithelium are seen, on focussing more deeply the branched pigment cells of the stroma in the intervascular spaces and the large blood vessels. Isolated hexagonal pigment cells are usually found at the margin, and one of these should be examined with the oil-immersion lens. The pigment consists of small rod-shaped crystals.

VESSELS OF THE CHOROID.

These are best studied from their outer aspect. A hardened eye is incised around its equator. The incision should involve the sclera only; this structure is then dissected off as far as the ora serrata in front and the optic nerve behind. The fibres of the supra-choroid layer should not be torn away, but carefully divided with scissors. In this way the venæ vorticosæ are exhibited.

Sattler has investigated the finer structure of the choroid, and published a very full account of this. ("Ueber den feineren Bau der Choroidea," *von Graefe's Archiv*, Bd. XXII, S. 1). Specially interesting is the view of the first endothelial layer which lies between the chorio-capillaris and the layer of medium-sized blood vessels. This layer can, according to *Sattler*, be demonstrated in a piece of choroid stained with hæmatoxylin, after removal of the outer vascular layers with their pigmented stroma, by placing it on a slide with the membrana vitrea lowermost. The microscope (high power) is now focussed for the inner surface of the membrana vitrea, which can be recognised by the remains of the retinal pigment cells adhering to it. When the tube is gradually raised the following structures come into view, the grating-like configuration on the outer aspect of the membrana vitrea, then the contours and the nuclei of the capillary vessels, next the pale oval nuclei of the cells forming the first endothelial layer (*Sattler's membrane*).

Lens.

Formalin of the usual strength should not be employed in the preparation of the lens, since it renders it much too hard.

In the form of a weak (2 per cent.) solution, however, formalin may be recommended. In this the lens remains for two to four days, and is then further hardened in alcohol, gradually increased in strength. The lens fibres swell up in sublimate solutions.

The lens must not remain too long in Müller's fluid, or it becomes quite hard and brittle.

When it is of no importance to maintain the shape of the lens, it may be hardened from the first in alcohol.

It should be observed that paraffin imbedding is not adapted for the lens.

Zenker's fluid is the best medium for hardening the lens. Imbedding in celloidin. In order to obtain good sections, we must divide the lens capsule. If the lens is still in the eyeball after imbedding we cut down on it till a slice has been removed from its anterior surface. The block is then placed in the alcohol-ether mixture, and the preparation is re-imbedded.

The terms employed in the description of the lens are similar to those applied to the globe itself. The lens is thus said to possess an equator, various meridians, an anterior and a posterior pole, and an axis. It is better to speak of equatorial and meridional sections, and to avoid loose expressions such as cross and longitudinal sections.

The following layers are distinguished :—

I. THE LENS CAPSULE.

This is a homogeneous elastic membrane which envelopes the lens completely. It is thicker in front than behind, and thickest of all at the margin of the anterior surface. When lacerated, the capsule retracts like an elastic band, the margins of the wound curling with the outer surface inward. The capsule is very resistant to reagents, and persists unchanged for long periods in various pathological processes.

2. THE ENDOTHELIUM OF THE LENS CAPSULE.

This is a single layer of flattened cells which lie beneath the anterior portion of the lens capsule, extending outwards towards the equator. When examined in the fresh state in a drop of aqueous, the cells are seen to be bright and finely granular. They exhibit a large nucleus and one or two nucleoli. The contours of the cells are polygonal, mostly hexagonal, so that a surface view presents the appearance of a delicate mosaic. Towards the equator the cells become more slender and elongated, and pass gradually into nucleated lens fibres. The equatorial transition zone is called the *Lens Whorl*. It is indistinct in old age.

The capsular endothelium is very liable to undergo changes. It is often found to be altered in the old, probably as a preliminary stage in the formation of a cataract, while the lens fibres are still unaffected. The changes are still more marked when the lens becomes cataractous as a result of experiments or injury. The cells over a considerable area are often degenerated, the protoplasm swelling up and becoming coarsely granular and vacuolated. The nucleus exhibits similar changes. These changes can be best demonstrated by tearing off shreds of the capsule with the adherent endothelium, and staining with carmine. (Hess, "Ueber Naphthalinveränderungen," *Ophth. Gesellschaft*, 1887; Schirmer, "Studie über Maturation der Cataract," *von Graefe's Archiv*, Bd. XXXIV, Heft i, etc.)

Karyomitoses can be demonstrated, especially in the equatorial region, after injuries. This is apparent after 20 hours, and most evident after 4-6 days. (Kiribucki, "Experimentelle Untersuchungen über Cataract," *von Graefe's Archiv*, Bd. L, Heft i.) The cells show a great tendency to proliferate and form plexuses of spindle-shaped elements (Capsular Cataract).

3. THE LENS SUBSTANCE.

This consists of fibres, *Fibræ Lentis*. The fibres are ribbon-like and of almost the same width throughout their length. In cross-sections they are seen to be hexagonal. The peripheral fibres are broader and thicker than the central. Around each there is an extremely thin layer of cement-substance, which appears as a thin black line if the section is immersed for a short time in a weak solution of nitrate of silver (1 in 800-1000).

The lens fibres abut against one another, in certain planes radiating from the axis. The edges of these planes form on the anterior and posterior surfaces the *Lens Stars*. In the new-born child each star has three rays; in the adult the figure is more complicated. The rays are rendered very prominent by immersing the lens, as soon as removed, in a solution of silver nitrate, 1 in 500. They then appear as black lines on a brown ground. In many animals the lens star is simpler than in man. (Friedenberg, "Ueber die Figur des Linsensternes," *Archiv für Augenheilk.*, Bd. XXXI.)

A thin layer of liquid is often found between the capsule and its epithelium. In hardened preparations this *Subcapsular Layer* is coagulated in the form of minute granules, or appears as a fine network of fibrillæ. Morgagni's globules occur in this layer in old lenses.

There is a similar layer of nutrient fluid between the endothelium and the lens fibres, the *Subendothelial Layer*. (See also, Carl Rabl, *Ueber den Bau und die Entwicklung der Linse*. Leipzig, W. Engelmann, 1900.)

Zonule.

The zonule, or suspensory ligament of the lens, does not, as was once supposed, consist of membranes, or lamellæ, enclosing the so-called Canal of Petit, but of a large number of fine radiating fibres (*Fibræ Zonulares*). Most of the fibres spring from the intervals between the ciliary processes, and some of them can be followed backwards over the orbiculus almost as far as the ora serrata. The fibres which arise farthest back pass mainly to the anterior surface of the lens, while those which are inserted into the posterior surface of the lens have their origin in front towards the posterior chamber. The two sets of fibres cross each other near the ciliary processes. There are also intermediate fibres between the anterior and posterior main bundles; these pass to the equator of the lens. The zonule is thus formed exclusively of fibres enclosing intercommunicating intervals which maintain a connection between the posterior chamber in front and the spaces in the vitreous behind.

Demonstration of the Zonule.

A survey of the zonule is obtained as follows: A hardened bulb is divided along the equator, and the vitreous removed by means of forceps and a brush. The cornea and sclera are detached close to the root of the iris in front. The iris is then excised. When the preparation is examined from the front by transmitted light and with the aid of a magnifying-glass, fibres can be seen stretching between the summits of the ciliary processes and the equator of the lens. From behind it is observed that the main body of the fibres passes back between the ciliary processes, leaving the summits of these free from attachments.

If the scissors are now passed from behind and made to divide the zonule close to the processes, the lens can be removed surrounded by a ring of fibres. These are rigid as a result of the hardening, and enclose an annular prismoidal space, the base of which corresponds to the equator and to the margins of the two surfaces of the lens.

Meridional Sections should be made first, and they should be fairly thick. The fibres are seen to occupy a triangular area between the lens and the ciliary processes. They are arranged more closely at the anterior and posterior boundaries, but intermediate fibres are also visible. Further, in such sections the crossing of the fibres is demonstrated.

The structure of the zonule is, however, best recognised in *Cross-Sections* through the fibres and the ciliary processes. Numerous fine points are visible between the processes, and in front of and behind these. The points are the cross sections of the fibres.

Corpus Vitreum.

The demonstration of the structure of the vitreous body presents special technical difficulties.

A. The following method (Lenhosseck, Ogawa, *Archiv für Augenheilk.*, Bd. LV, S. 52) has proved valuable.

To avoid rapid and too extensive shrinking of the vitreous, the eyeball, before it is opened, is placed for —

1. Eight days in Müller's fluid to which there has been added half its volume of 10 per cent. formalin.
2. Six weeks in pure Müller's fluid (Elschnig).
3. One day in running water.
4. Two or three weeks in alcohol gradually increased in strength.
5. The eyeball is now opened, while it lies in the exsiccator, by removing the cornea, or by making a section with a sharp knife parallel to the equator.
6. Imbedding in celloidin. The tissue should be placed in very thin celloidin, and this should be allowed to become thick by slow evaporation. This is a most important precaution, since the shrinking takes place mainly in the celloidin.
7. The mounted block is kept in 80 per cent. alcohol, until sections are made.

Staining.

1. Delafield's hæmatoxylin is used to demonstrate the framework of the vitreous, ordinary hæmatoxylin-eosin to demonstrate the cells.

2. Washing in water.

3. Alcohol. Xylol. Balsam.

In sections stained with hæmatoxylin, after 24-48 hours, all the tissues of the vitreous are over-stained with the exception of the fibrillæ.

Good preparations of the vitreous may also be obtained by injecting Zenker's fluid into the centre of the tissue, and afterwards employing van Gieson's stain.

(To be concluded.)

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—MINERS' NYSTAGMUS.

Browne, F. J., and Mackenzie, J. Ross.—The etiology and treatment of miners' nystagmus, with a review of 100 cases. *British Medical Journal*, October 5th, 1912.

Browne and Mackenzie, of Abertillery, Mon., have carefully analysed 100 consecutive cases of miners' nystagmus. They conclude that the causes of the disease are not numerous, and, arranged in order of relative frequency and importance, are : (1) inadequate light, (2) errors of refraction, (3) straining of ocular muscles, and (4) neurotic temperament

1. *Inadequate light*.—That this is an important cause of the disease is conclusively proved by the fact that 99 per cent. of the cases had been working by the darkness of a safety lamp for many years. In only one case had the patient worked in a candle mine, and he was hypermetropic, of a neurotic type, and was physically debilitated.

2. *Errors of refraction*.—90 per cent. had errors of refraction. In three cases there was so much photophobia that the refraction could not be determined, and only 7 per cent. shewed normal refraction.

3. *Straining of the extrinsic muscles of the eyeball*.—In all cases the men had been working in narrow seams. 90 per cent. of the men were "holers," the remaining 10 per cent. were hauliers and timber men.

4. *Neurotic temperament*.—The inability of a large number of nystagmic miners to concentrate their physical and mental powers upon any particular line of action leads to the conclusion that nervous instability is more the cause than the effect of nystagmus. This factor would repay careful study.

Prevention.—This revolves itself into periodical examination of all miners for errors of refraction, signs of incipient nystagmus, and for evidences of physical and nervous debility. To this must be added the importance of adequate illumination. It is surprising that even in the most up-to-date collieries, there is at present no indication of electric light being installed in the workings. The authors are satisfied that were these examinations made, and was adequate illumination provided, nystagmus would disappear.

Treatment.—Rest, strychnine, and correction of errors of refraction sum up the necessary measures. A full analytical table of all the cases accompanies the table.

We fully agree with the authors in their conclusions, which coincide with the views of all recent workers in this subject, although we think that perhaps too much weight has been given to errors of refraction. Slight degrees of hypermetropia, under 1.5 D., are common in all civilised races and in normal individuals not engaged in close work, are unnoticed, and do not usually cause eyestrain. The same is even truer of small degrees of myopia. Cridland finds that nystagmic miners are not more affected with errors of refraction than normal individuals. We have found that 40 per cent. of our cases have marked errors, but many nystagmic miners have either normal refraction or only one diopetre of hypermetropia or myopia. But in many of our cases we have been

unable to determine the refraction, because of the excessive photophobia and nystagmus. The authors, too, have not laid any stress upon the twitching of the lids and neck muscles, which is a common symptom of the disease.

T. HARRISON BUTLER.

II.—BLINDNESS.

- (1) Mackay, G.—The causes and prevention of blindness. *Edinburgh Medical Journal*, August, 1910.
- (2) Heller, S.—Prophylactic measures for persons about to become blind. (Prophylaktische Massnahmen für später Erblindende.) *Zeitschrift für Augenheilkunde*, Januar, 1911.
- (3) Beduarski.—The causes of blindness in children. (Les causes de cécité chez les enfants.) *Archives d'Ophtalmologie*, juin, 1911.
- (4) Taft, William Howard.—The industrial education of the blind. *Ophthalmology*, July, 1911.
- (5) Woodruff, Thomas, A.—Prevention of blindness. *Canada Lancet*, September, 1911.
- (6) Schweinitz, G. E. de.—The prevention of blindness and the instruction of the blind child. *New York State Journal of Medicine*, June, 1912.

(1) Mackay, of Edinburgh, in a lecture delivered to the Scottish Out-Door Blind Teachers' Union, described and explained the more frequent causes of blindness. A large proportion of the cases were blind from diseases which could be prevented by increased morality, by the prohibition of marriage of diseased persons, and by care of the new-born children.

There were many persons blinded by cataract receiving the benefits of the Blind Mission in Glasgow. Probably many of them might be greatly benefited by operation.

T. HARRISON BUTLER.

(2) Heller, of Vienna, in a paper read before the Vienna Ophthalmological Society on November 14th, 1910, pointed out that persons who were certain to become blind should be sent to a training school before all sight had been lost. Instruction was then much easier than with the absolutely blind.

T. HARRISON BUTLER.

(3) Beduarski, of Lemberg, has examined 100 cases of bilateral blindness and 200 cases of unilateral blindness in children below the age of twelve years, with a view to obtaining statistics as to their ætiology.

The 300 cases occurred in 4,267 of all cases below the age of twelve which presented themselves at the Children's Hospital at Lemberg during a period of $5\frac{1}{2}$ years.

Among the totally blind, phlyctenular keratitis, scrofula, and tuberculosis were responsible for the highest percentage, namely, 33 per cent., congenital diseases accounted for 23 per cent., blennorrhagic conjunctivitis 15 per cent., and meningitis 9 per cent., various other diseases giving small percentages varying from 1 to 4.

Among the partially blind, phlyctenular keratitis, scrofula, and tuberculosis, again showed the highest percentage, namely, 59 per cent., blennorrhagic conjunctivitis next with 12 per cent., and traumatism 10.5 per cent., a number

of other causes giving small percentages. Thirty-nine of the cases occurred in the first year, 9 per cent. in the second, 10 per cent. in the fourth, the percentages for the following years up to the 11th, being 3, 6, 5, 4, 5, 3, 5, respectively. The figures confirm the statement that blindness occurs chiefly in infancy.

BERNARD CRIDLAND.

(4) This article consists of some remarks made by the late President of the United States at the opening of the Industrial Exposition of the Blind at New York, on 26th April, 1911.

A. J. BALLANTYNE.

(5). According to **Woodruff**, 40 per cent. of the blindness of the world is the result of ignorance, neglect, and carelessness. Among the numerous causes of preventible blindness cited, are industrial accidents, accidents at play, sequelæ of infectious diseases, wood alcohol, and ophthalmia neonatorum. The subject is then discussed under the following headings:

- (1). Industrial accidents.
- (2). Wood alcohol.
- (3). Trachoma.
- (4). Ophthalmia neonatorum.
- (5). The cost of needless blindness in New York and Ohio.

Industrial accidents are largely unnecessary, and could easily be prevented. About 15 per cent. of the injuries met with are those affecting the eyes, and, unfortunately, these occur mostly at the time of life during which a man is most productive. The means taken by the United States Steel Corporation to safeguard their employes is noted. With the establishment of the central committee of safety, their accidents have been reduced 50 per cent.

Wood alcohol, the cheap substitute for grain alcohol, is still pressed upon the large consumer, the manufacturer, and the housewife. Its use is responsible for loss of sight and life.

Because of its complications and sequelæ, trachoma is one of the most serious of eye diseases. It is on the increase in the United States. Of all the pupils attending two large public schools in New York City 20 per cent. were found with infectious eye diseases, and of these 25 per cent. had trachoma. Among preventive measures which should be taken, Woodruff advises rigid examination of all classes of immigrants, hygienic regulations to prevent spread of the disease, and the compulsory reporting of all cases of trachoma to the proper authorities.

The gonococcus is responsible for two-thirds of all the cases of ophthalmia neonatorum. Infection takes place before birth, during birth, immediately after, or several days after birth. The symptoms, treatment, and prevention are described in detail. Even with preventive means at our disposal, numerous cases occur. In the United States there are more than ten thousand persons blind from ophthalmia neonatorum. The public should be educated, births should be reported early, and the question asked on the certificate, "What preventive for ophthalmia neonatorum did you use? If none, state the reason therefor."

The sum of \$50,000 is expended annually in New York and Ohio for the support of persons blind from ophthalmia neonatorum. This does not include appropriations made by the State to private institutions, nor the cost of maintaining and educating blind children at private expense.

The significant statement is made that the cost of maintenance and education for each child in New York State School for the Blind is 407.43 dollars a year, while each ordinary child attending the public schools of Buffalo costs the State but 30 dollars a year. It only remains to be said that one-third of the inmates of the Blind School have been victims of ophthalmia neonatorum.

HANFORD MCKEE.

(6) **de Schweinitz**, of Philadelphia, discusses at considerable length some diseases responsible for acquired blindness, more especially ophthalmia neonatorum and trachoma. To this is appended a good account dealing with the care of the blind child. As to the prevention of ophthalmia neonatorum, de Schweinitz discusses: (1) the education of midwives, nurses, and medical students, and the mothers of families, especially in poor and crowded districts; (2) compulsory prophylaxis and the gratuitous distribution of a suitable chemical agent for prophylaxis; and (3) obligatory notification of the disease.

SYDNEY STEPHENSON.

III.—SYPHILIS AND INJURIES OF THE EYE.

- (1) **Antonelli, A.**—Syphilis and ocular traumatism. (*Syphilis et traumatismes oculaires.*) *Archives d'Ophtalmologie*, septembre, 1910.
- (2) **Gonzalez.**—The influence of traumatism on the appearance of interstitial keratitis. (*Influencia del traumatismo en la aparicion de la queratitis intersticial.*) *Anales de Oftalmologia*, October, 1910.
- (3) **Antonelli, A.**—Syphilis and ocular injuries. (*Sifilide e traumatismi oculari.*) *Rivista Italiana di Ottalmologia*, October, 1910.
- (4) **Franco.**—Injury in the genesis of interstitial keratitis. (*Le traumatisme dans la genèse de la kératite interstitielle.*) *La Clinique Ophtalmologique*, 10 janvier, 1912.
- (5) **Kümmell, R.**—Keratitis parenchymatosa after injury. (*Zur Frage der Keratitis parenchymatosa nach Trauma.*) *Klin. Monatsbl. f. Augenheilk.*, April, 1912.

(1) **Antonelli**, of Paris, publishes four cases of parenchymatous keratitis following slight injuries of the cornea:

The first was that of a young woman of 26 years, with definite signs and history of congenital syphilis, who received a foreign body in the left eye. Eight days later, unmistakable signs of interstitial keratitis developed. The condition, which spread over the whole cornea, began to improve in two and a half months, clearing up in seven. The right eye remained free.

The second was that of a man, 29 years of age, with fairly well-marked stigmata of congenital syphilis, in whom the removal of a foreign body from the left cornea was followed in a few days by a typical parenchymatous keratitis. The condition was treated by mercurial injections, and lasted nearly four months. The other eye remained free.

The third was where a man received a slight blow on the right cornea from some rubbish. He was seen for the first time by Antonelli one month later, although under treatment previously. Typical interstitial keratitis had developed, affecting two-thirds of the cornea. There were few signs of hereditary syphilis, but the family history was very suggestive. The condition lasted over seven months. The left eye was unaffected.

The fourth case was that of a man of 27 years, who sustained a corneal abrasion in the right eye. There were ophthalmoscopic signs of congenital syphilis, but no other. Eight days after the injury, signs of parenchymatous keratitis were present, steadily increasing until the whole cornea was affected. The condition lasted three months. The left eye remained free.

Cases of interstitial keratitis following a traumatism, in order to be considered authentic, should, in Antonelli's opinion, fulfil the following conditions, namely :—

1. Absence of any ocular trouble, subjective or objective, before the accident ; that is to say, the eye must be known to be healthy at the time of the accident.
2. The traumatism must affect the cornea, either directly, as by a corneal abrasion, etc., or indirectly, as by a contusion of the globe.
3. The keratitis must follow the injury after a brief interval only, and be of the definite parenchymatous type and not "more or less interstitial, more or less like the discoid keratitis of Fuchs or any other keratitis following traumatism."

It is therefore necessary to be very reserved in admitting an origin undoubtedly traumatic for an interstitial keratitis of classic form. With regard to the third condition, it should be remembered that all cases of keratitis of deep form and long duration are not interstitial. Some of those published as "parenchymatous keratitis following injury" do not fall in with the signs of interstitial keratitis, properly speaking. The "discoid keratitis" of Fuchs in its various forms and the "central annular type of Vossius" are conditions which render the diagnosis of true interstitial keratitis a delicate one. Vascularisation and its effects—a valuable sign—may be present in discoid keratitis, as von Hippel has noted, and may be absent or hardly noticeable for a brief period in parenchymatous keratitis of undoubted heredo-syphilitic origin (avascular types). Again, in cases where the traumatic lesion persists, recognised by its situation, by its appearance of facetting, ulceration, and localised, sub-epithelial infiltration, the diagnosis of interstitial keratitis must be distrusted. Persistence of pain is also against it, for beyond visual affection and sometimes photophobia, patients with interstitial keratitis do not suffer, a fact daily observed even when iritis is present.

With regard to the occurrence of an interstitial keratitis in the "non-traumatised" eye at some period after the condition has been present in the "traumatised" eye, and called by some "sympathetic" or "post-traumatic," Antonelli does not agree with the view that it is connected with the original injury. The question (brought forward first by Perlia in 1905, and by others at a later date), is, in his opinion, by no means settled. He regards it rather as a coincidence, and considers that interstitial keratitis in the second eye would have occurred in any case, apart from the injury, and that for it the constitutional condition is alone to blame. Furthermore, in such cases the history of an injury is more open to doubt. From the point of view, then, of compensation for injury, the responsibility of the "assurer" is far from being increased, but rather lessened on this account. In conclusion, Antonelli agrees with Imbert, who in a recent article on the question of the "previous condition" of the individual in compensation cases, says, "It would appear just to disregard the 'previous condition' when it has not affected the actual organ about to be injured by traumatism, but to take account of it when it has been found to have already reduced the function of the organ before the accident."

BERNARD CRIDLAND.

(2) It is now generally agreed that a trauma, even although very slight in itself, can determine the onset of interstitial keratitis in individuals who are the subject of hereditary disease. **Gonzalez** adds two cases in which a trivial injury was followed by interstitial keratitis in children who showed other stigmata of inherited syphilis.

HAROLD GRIMSDALE.

(3) The relation between the ocular manifestations of syphilis and preceding injury, has been discussed, says **Antonelli**, of Paris, at several Congresses. As a result of long discussion, several conclusions have been come to by Petit and

others, as to the occurrence of special syphilitic inflammations after small injuries, and as to the particular course which is followed by small wounds in patients who are the subject of active untreated or insufficiently treated syphilis.

The chief discussion lately has been about interstitial keratitis. There is no doubt that this not very infrequently follows on injury; but the nature of the relation is not yet entirely agreed upon. In a series of cases which Antonelli reports, the inflammation followed an injury in an eye previously sound, and was not complicated by any affection of the fellow eye. The spontaneous keratitis is so commonly bilateral that the affection of one eye only is a strong point in establishing a causal relationship between the injury and the inflammation. In such cases the justice of compensation is much clearer than when the injury is followed by a bilateral inflammation. Here the probability is that the inflammation would have appeared without the exciting injury, which has little, if any, relation to the outbreak.

HAROLD GRIMSDALE.

(5) While not denying that injury may be a factor in causing parenchymatous keratitis, **Kümmell**, of Erlangen, holds that we must accept the traumatic origin of such a condition in each case only after the most careful investigation of the evidence. There must be definite proof of the occurrence of an injury, and an injury of an adequate kind. The locality of the keratitis must correspond with the site of the injury, and there must be a reasonable time-relationship between the occurrence of the injury and the onset of the keratitis. No connection can be admitted between injury in one eye and keratitis in the other, but trauma might be a factor in exciting the condition in one and not in the other. If the keratitis occurs simultaneously in both eyes, the same constitutional cause will account for both, and it is unlikely that injury has been an element in the case. Transference of parenchymatous keratitis from one eye to the other does not occur, nor is there any ground for the theory that keratitis in one eye, by irritating the ciliary nerves, causes an increased amount of albumen to be formed in the anterior chamber of the other.

Four cases are given, illustrating the importance of the subject from the point of view of workman's insurance.

A. J. BALLANTYNE.

IV.—HÆMATOMA OF THE ORBIT.

- (1) **Brandès, F.**—A contribution to the study of spontaneous hæmatomata of the orbit. (Contribution à l'étude des hématomes spontanés de l'orbite.) *La Clinique* (Bruxelles), 13 mai, 1911.
- (2) **Gruening, E.**—Idiopathic hæmatoma of the orbit. *Trans. Amer. Ophth. Society*, Vol. XIII, Part I, p. 108, 1912.

(1) **Brandès**, of Antwerp, reports a case of a large extravasation of blood into the orbit of a girl of eleven months, at first believed to be due to whooping cough, from which she was suffering. There was pronounced proptosis, the eyeball being surrounded by intense chemosis, which showed a trace of gangrene upon its surface. Nine days later, a similar extravasation was observed in the other orbit. This was followed, a couple of days afterwards, by another hæmorrhage into the orbit first involved. To shorten the story, definite signs of scurvy appeared, thus affording a satisfactory explanation of the former hæmorrhages. The diagnosis once made, recovery was speedy.

SYDNEY STEPHENSON.

(2) As **Gruening**, of New York, remarks, idiopathic hæmatoma of the orbit is extremely rare, and in the present communication he gives an account of the only case that he had met with in his own practice. The material facts follow.—The patient was a girl, aged seventeen years, and when seen by Gruening, the illness was of twelve days' duration and of unknown cause. The condition is shown in Figs. 1 and 2. The right eye was prominent 15 mm., and the ocular conjunctiva below the cornea concealed the lower lid,



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

forming, as it were, a sausage-like roll overlapping the entire length of the latter. The mobility of the eyeball was greatly impaired, not exceeding 2 mm. in any one direction: movement downward was completely abolished. Choked disc (plus 6 D.). V.= 1/10. A suggillation, to which Gruening attaches some diagnostic importance, was present in the lower lid. Rest, cold

compresses, and potassium iodide for eleven days led to no improvement. It was then thought that the condition might be one of rapidly growing orbital sarcoma, and it was accordingly decided to explore the orbit. After the orbital fascia had been incised, a soft encapsulated mass protruded, and when this was cut into, a large quantity of liquid blood was evacuated. Exploration with the finger disclosed no other cause for the protrusion of the eye. Wound closed with points of suture. Ten days after operation, condition as shown in Figs. 3 and 4. Optic neuritis had disappeared; patient had regained her sight; and the mobility of the eye was restored, except downwards.

Gruening concludes that this was an example of a blood-cyst.

SYDNEY STEPHENSON.

V.—REMEDIES.

- (1) May, Charles H.—The treatment of trachoma with radium. The use of radium-coated celluloid plates for this purpose. *Trans. Amer. Ophth. Society*, Vol. XIII, Part I, 1912.
- (2) Calderaro.—The action of strychnine on the retinal functions of the normal eye. (*Influenze della stricnina sulle funzioni retiniche dell'occhio normale.*) *La Clinica Oculistica*, July-September, 1912.
- (3) Beauvieux.—Tuberculin and ocular tuberculosis. (*Tuberculine et tuberculose oculaire.*) *Archives d'Ophthalmologie*, septembre, 1912.
- (4) Harris, Clarence M.—Refraction and the use of cycloplegics, with especial mention of hyoscine. *Journal of Ophthalmology and Otolaryngology*, September, 1912.
- (5) Bistis, J.—On the eye complications following the use of arsenobenzol and their significance. (*Ueber die nach Arsenobenzol auftretenden Augenkomplikationen und ihre Bedeutung.*) *Zeitschrift für Augenheilkunde*, August-September, 1912.
- (6) Dutoit, A.—Experiments upon internal medication with iodine in glaucoma. (*Versuche mit Interner Jodtherapie bei Glaukom.*) *Zeitschrift für Augenheilkunde*, Aug.-Sept., 1912.
- (7) Santos-Fernandez, J.—Duboisine is preferable to atropine in the treatment of eye diseases, especially in children. (*La Duboisine doit être préférée à l'atropine dans le traitement des maladies des yeux, surtout chez les enfants.*) *Revue Générale d'Ophthalmologie*, 31st Decembre, 1912.

(1) May, of New York, summarises the work that has been done by others in the treatment of trachoma by radium. He gives several reasons, chief among which is the cost of the remedy, which go to show that the treatment can never become popular or universal. He has employed plates of celluloid, shaped like the solid blade of an entropion forceps, coated on one side with a film of radium bromide (radio-activity, 25,000) protected by a layer of water-proof varnish. Each of the plates required about £7 worth of radium bromide. The radium-coated surface of the plate was applied directly to the diseased conjunctiva of each lid for ten minutes, and exposures were

repeated every two or three days. Fifteen patients were selected for treatment, the radium being applied to one eye and copper sulphate to the other. The patients invariably complained more of the radium than of the bluestone. In no instance was the result as good with the former as with the latter agent. May concludes that the results do not warrant the adoption of radium instead of the more commonly used remedies.

SYDNEY STEPHENSON.

(2) This long and detailed paper gives the results of a large number of experiments which **Calderaro** has made on himself and other ophthalmic surgeons, with the object of ascertaining what, if any, is the action of strychnine on the retinal functions of the normal eye. Since Nagel, in 1872, introduced the drug into the armamentarium of the ophthalmologist for the treatment of diseases of the optic nerve, it has been a matter of discussion whether there were any action on the normal eye or not. For the most part, surgeons have accepted the observations of v. Hippel, although Cohn had contradicted the findings. Now Calderaro has investigated, in the most careful way, the retinal functions from every point of view, and his results are apparently decisive that strychnine has no action on the retinal functions at all, except that whereas these functions, tested repeatedly, have certain limits of variation, the injection of strychnine keeps them raised to their maximum for the two days following the administration.

"One must not conclude from these results," says Calderaro, "that strychnine has no useful action on the retina and optic nerve in pathological conditions of a hypotonic type, especially since the experiments go to show that the drug increases the tonicity of the retinal elements; we must rather conclude that in those maladies in which there is temporary torpor of the retina, the action of the strychnine will be beneficial, similar to that of an electric stimulus."

In a future paper Calderaro promises to give the results of experiments on pathological eyes.

HAROLD GRIMSDALE.

(3) **Beauvieux** records satisfactory results from the use of tuberculin in ocular tuberculosis, more especially in cases where the deeper parts of the eye were involved.

He uses "tuberculin C.L." of the Lille Pasteur Institute prepared according to Calmette's principles. His *technique* is that of von Hippel slightly modified. The first injection is given hypodermically in the forearm to observe the cuti-reaction, subsequent ones being given intramuscularly in the buttock. Beginning with 1/1000th of a milligramme, an injection is given every two days increasing by 1/1000th of a milligramme each time up to 1/100th of a milligramme, thence by 1/10th up to a maximum dose of 1 milligramme, which is never exceeded. If the temperature rises above 37.5°C. the dose is repeated without increase until all febrile reaction has disappeared.

The results of six cases are given in detail, in three of which the posterior uveal tract was involved, in two the anterior portion of the globe, and in the remaining one the annexes were concerned. Two of the first three were cases of disseminated choroiditis, one being complicated by tuberculosis of the iris and cornea, the third case being one of macular choroiditis. Excellent results were obtained in from four to six months.

The remaining cases comprised two of iridocyclitis and one of extrinsic ophthalmoplegia, with equally good results. Syphilis was excluded in all by the Wassermann reaction.

All had undergone various forms of treatment without success before coming under the author's care.

BERNARD CRIDLAND.

(4) **Harris** deals with the subject of refraction and a good deal more. He has high ideals of ophthalmic work, and especially of refraction. It affects the comfort and capability of such a large proportion of our populace, and as a prophylactic it cannot be overestimated. The muscle balance must also be carefully investigated, and the fundus carefully explored. While dealing with the eye, the patient's general condition must not be lost sight of. Hyoscin was used on the suggestion of Wendell Reber, of Philadelphia. Reber's experiments showed that hyoscin was more rapid in its action than scopolamine,* fifty-nine minutes in the one case as against ninety-two minutes in the other being required to suspend the accommodation. The strength of solution recommended is 1:1000. Procure some of Merck's hyoscin hydrobromide and triturate one grain of it with eight grains of cocaine hydrochlorid. One half grain of this is weighed out, and one dram of water added, so that one gets an absolutely fresh solution.

Hyoscin is levo-rotatory to polarised light. Scopolamine loses its power of optical rotation in aqueous solution, but no difference has been observed on comparing fresh solutions of hyoscin with those two or three weeks old.

Hyoscin, properly used, is equal to atropine, and in many instances superior to homatropine; most of the cycloplegia disappears in forty-eight hours. Harris has never had any toxic effects among patients seen at his office, and but once in a child when the drops were used at home.

The references to the use of the polariscope in determining the purity of this class of remedies are most interesting. HENRY L. G. LEASK.

(5) **Bistis**, of Athens, deals with the possibility of injections of '606' being the cause of the optic neuritis, paralysis of ocular muscles, and inflammations of the uvea, which are occasionally seen in patients who have had injections of this substance to cure their syphilis. He agrees with the majority of authors who have written upon the subject in ascribing their complications, not to arsenobenzol, but to syphilis. The paper contains nothing new. But every confirmation of the fact that Salvarsan has not the toxic properties of atoxyl and the earlier Ehrlich arsenic combinations is of value.

T. HARRISON BUTLER.

(6) **Dutoit**, of Montreux, has already contributed to the *Zeitschrift* papers upon his experiments with Scott's emulsion for the treatment of the general condition in eye disease, and upon the use of fluid somatose in ocular affections. The present paper urges the advantages of another product of modern pharmacology, "Potassium Iodide Gelodurate Capsules." He thinks that the inorganic compounds of iodine, the potassium, sodium, and ammonium salts, will soon be given up on account of the tendency they all have in a greater or lesser degree to produce iodism. The organic combinations of iodine are better tolerated, and so can be used to exert a favourable influence upon the arterio-sclerosis which is such an important factor in some cases of chronic glaucoma.

T. HARRISON BUTLER.

(7) Possibly the most important part of the article by **Santos-Fernandez**, of Havannah, is the ample bibliography, since in the article itself the author does little more than state that, in his opinion, duboisine is less toxic, although more costly, than atropine. He relates a number of cases in illustration of his view, and from these, and from the author's insistence on the toxicity of atropine in solutions of ordinary strength, one would be inclined to think that the idiosyncrasy to this drug is greater among his patients than among Europeans. It may be permissible to suggest that a greater degree of

* Nevertheless, Messrs. Merck inform us, in answer to a question, that hyoscin hydrobromide and scopolamine hydrobromide are identical.—EDITOR.

patency of the nasal passages might possibly account for such an apparent idiosyncrasy, if such patency were found to be a characteristic. At any rate, it is certain that, in the reviewer's practice, the toxicity of atropine in ordinary strengths gives rise to very little anxiety.

ERNEST THOMSON.

BOOK NOTICES.

Text-Book of Ophthalmology in the form of Clinical Lectures. By DR. PAUL ROEMER, of Greifswald. Translated by DR. MATTHIAS LANCKTON FOSTER. Volume II. Undated. London: Rebman Limited, 129, Shaftesbury Avenue, W.C. Price 10s. 6d. net.

The second volume of Dr. M. L. Foster's translation of Professor Paul Roemer's *Lehrbuch der Augenheilkunde in der Form klinischer Besprechungen* has just reached us. It deals, under the form of clinical lectures, with diseases of the eyelids, vitreous, sclera, lacrymal organs, and of the orbit, and includes, besides, sections on glaucoma, strabismus, and injuries of the eye respectively. That the book is in the first place designed for advanced students of ophthalmology may be inferred from the elaborate descriptions of disease, and the excellent illustrations, of which the book includes one hundred and eighty-six text illustrations and thirteen coloured plates.

No indication is given how many more volumes will be required to complete the book. Under these circumstances we must do as we did before when noticing Volume I, namely, postpone any kind of detailed criticism until the work is fully completed. The book, however, is very well worth buying.

Adrenalin Mydriasis and its Diagnostic Significance. (*Die Adrenalin-mydriasis und ihre diagnostische Bedeutung.*) By RICHARD CORDS, Bonn, Germany. Wiesbaden: Verlag von J. F. Bergmann, 1911. Price, 1.60 Mark.

This small work collects practically all that is known about the mydriatic action of adrenalin. All the original papers have been carefully read and are critically discussed, and the author adds much research carried out by himself. The final result of Cords' study of the subject is crystallised in his own summary.

Adrenalin, now a definite chemical body, is a mydriatic which probably acts upon a receptive substance in the dilator muscle in the sense propounded by Langley.

The appearance of mydriasis in normal animals and in normal man is a mere question of dosage. It depends entirely upon the amount of the active substance which comes into contact with the dilator muscle; nevertheless, there are marked differences in its action in different species of animals. In rabbits, in order to attain a maximal mydriasis, the aqueous must contain an amount corresponding to from 1 in 150,000 to 1 in 200,000. The instillation of a 1 % solution of synthetic hydro-chloride of adrenalin (Hoechst) never causes an obvious mydriasis, even when repeated several times. Subconjunctival injection of the drug gives a maximal dilatation in about twenty minutes.

Cords takes adrenalin mydriasis in man to mean the disposition of an eye to react to a repeated instillation of a 1 % solution of the pure drug in

the sense of an obvious dilatation of the pupil. It is best to make three instillations within a space of five minutes, and to examine the pupils in a subdued light.

Any defect in the cornea, even a small one, especially a lesion of the epithelium, such as an ulcer, so facilitates the penetration of adrenalin into the anterior chamber that mydriasis follows the instillation. This fact must be borne in mind; for errors can easily result if the cornea be not carefully examined.

Adrenalin mydriasis occurs in all conditions associated with increased excitability of the sympathetic system, the dilator of the pupil. This increased excitability can be experimentally produced in animals by subcutaneous injections of adrenalin. Those animals, which before did not react when adrenalin was instilled into the eye, then show marked mydriasis.

Adrenalin mydriasis is also seen in conditions in which the equilibrium of the internal secretions is disturbed as in functional derangement of the pancreas, over-action of the thyroid, diabetes mellitus, and, perhaps, Graves' disease. It is probable that in all these there is an increased amount of adrenalin in the blood.

The presence of adrenalin mydriasis in lesions of the peritoneum, stomach, and intestines probably depends upon an increased irritability of the sympathetic system. The same holds for affections of the central nervous system and similar conditions.

The action of adrenalin upon those animals in which the action of the superior cervical ganglion upon the iris has been removed for two days is of especial interest. The operation increases the excitability of the receptive substance of the dilator muscles so enormously that the smallest dose of adrenalin, either subcutaneously administered or simply instilled, causes maximal mydriasis. Clinical experience shows that the same phenomenon can be obtained in man. Præganglionic paralysis of the sympathetic has absolutely no action upon the effect of adrenalin. This fact may be of great value in deciding the exact site of the lesion of the first division of the fifth nerve. The spot where the sympathetic branch joins the first division of the trigeminal nerve lies only a few millimetres (the text has *centimetres*) distally from the Gasserian ganglion. If there be a complete paralysis distally to the spot, we generally get adrenalin mydriasis, because the sympathetic nerve suffers as well. A more proximal lesion causes no adrenalin mydriasis, and this is the usual condition of affairs in fifth nerve paralysis due to basal cerebral syphilis.

Dr. Cords' book is just as useful to the physician as it is to the ophthalmic surgeon. It must be regarded as a valuable addition to medical literature.

T. HARRISON BUTLER.

Eye-strain in Every-day Practice. By SYDNEY STEPHENSON. London: The Ophthalmoscope Press, 24-27, Thayer Street, W. 1913. Price 3s. 6d. net.

In an attractively got-up little volume Mr. Stephenson has collected a number of papers on eye-strain which he has at various times contributed to current literature. Most of these papers have already been read by ophthalmic surgeons and appreciated for their lucidity and point.

The articles in question, which form the seven chapters of this volume, are: I. On eye-strain, or asthenopia, and its detection in practice. II. On ocular headaches. III. On some unusual forms of migraine in children. IV. On

habit-spasm and eye-strain. V. On a common appearance of the optic disc liable to be mistaken for optic papillitis. VI. On cases of eye-strain simulating grave organic disease of the central nervous system. VII. On the aftermath of eye-strain.

In a book of this kind, consisting of a collection of articles by one author, all bearing in one way or the other on the same subject, it is unavoidable that there should be a good deal of repetition, unless, indeed, the individual articles had been recast. The author has evidently preferred to let the articles stand as they were originally written, and we think he has been right to do so. The repetition will do no harm, but rather will be beneficial. It will emphasize to the general practitioner, to whom the book is obviously addressed, the importance—only of recent years becoming understood—of eliminating eye-strain in many cases in which the obscure symptoms in no way point to the eyes as the cause of the trouble.

There is one thing certain about this volume: with its dull-surface paper, its large clear type, and its ample type-spacing, it will cause eye-strain in none of its readers.

Printer's errors are practically absent.

We congratulate the author on the production of a very useful and, at the same time, elegant addition to the library of the practitioner. S. E.

Bulletin de la Société Belge d'Ophthalmologie. No. 34. Gand: 21-23, Rue du Calvaire. 1913.

This slender paper-backed volume contains an analytical *compte rendu* of the communications made at the thirty-fourth meeting of the Belgian Ophthalmological Society, held at Brussels on the 24th of March, 1912. Considerable space is occupied by a communication on miners' nystagmus by Dransart and Vanhoutte, and of the discussion to which it gave rise.

The Anomalies of Scleral Tension. (*Die Anomalien der Skleralspannung.*) By HUGO STRANSKY. Bd. I. Leipzig und Wien: Franz Deuticke. 1912.

In his preface the author tells us that he has been impressed by the fact that the "tension" of the sclera, as clinically estimated by finger or tonometer, consists of two components, namely, the rigidity of the sclera, and the stiffness imparted to the sclera by the action of the intra-ocular pressure, and, further, that neither the finger nor the tonometer is able to distinguish between these two elements. As this is a source of error in the clinical estimation of intra-ocular pressure, he sets out to devise a means of distinguishing hardness due to scleral rigidity and hardness due to increased tension. Briefly put, his conclusion is, that if, in a given eyeball, intra-ocular pressure rises, the eye will expand, the increase of scleral tension being accompanied by a proportional increase in the diameter of the globe, while, on the other hand, increased rigidity of the sclera renders the eyeball less distensible, and, intra-ocular pressure remaining constant, the eye will become smaller. The distinction between an eyeball which is hard from increase in the scleral rigidity, on the one hand, and the same eye equally hard from increase of intra-ocular pressure, on the other, lies, therefore, in the difference of diameter.

On this basis he proceeds to build up his doctrine of the nature of simple glaucoma. The first section of the book is occupied with a discussion of the relationship of intra-ocular pressure, scleral rigidity, and scleral tension. It

fills some forty pages or more, but might very well have been condensed. It consists largely in an attempt to express this relationship in the form of equations, but one doubts whether a mathematician or a physicist would allow the validity of Stransky's methods. It is difficult to follow him in his use of the word "*Spannung*," which he employs in the different senses of tension, distensibility, increase of area, and increase of volume. It is true that the tension of the sclera involves all these ideas, but it seems hardly justifiable to substitute one for the other in an equation according to the convenience of the moment. In any case, where so much has to be taken on the authority of the writer himself, it seems superfluous to devote so much time and labour to proving, for example, that the resistance which meets the palpating finger is made up of the two components, scleral tension and scleral rigidity, or that the expansion of the eyeball varies directly with the intra-ocular pressure and inversely with the rigidity of the sclera.

Since increase in the scleral rigidity is the central point of Stransky's theory of simple glaucoma, he discusses the physiological and pathological causes which may bring about this increase. The only physiological cause of importance is advancing age, while pathologically he assumes the occurrence of a chronic inflammation of the sclera, leading to increase in its connective tissue elements. To this disease he gives the name *Scleritis indurativa*.

That no thoroughly satisfactory theory of simple glaucoma has yet been found will be generally admitted. Stransky states that the great obstacle has been the general belief that simple and inflammatory glaucoma are essentially the same disease. In his view, they are totally different conditions. He adheres to the accepted view that increased intra-ocular pressure is an essential part of inflammatory glaucoma, and that it is brought about by obstruction of the filtration channels. But simple glaucoma has nothing to do with rise of intra-ocular pressure. It consists essentially in a chronic indurative scleritis, the consequent increase in scleral rigidity being sufficient to account for the apparent increase of tension. Such an inflammation, he continues, may involve the whole sclera (*Scleritis inaurativa totalis* or *universalis*), or the anterior part only (*Scleritis indurativa antica*), or the posterior part only (*Scleritis indurativa postica*). It may affect the whole sclera from the outset, or it may begin as a partial affection and spread to the whole sclera. *Scleritis indurativa postica* is the condition usually described as simple glaucoma without rise of tension, or amaurosis with excavation. It is characterised by the presence of excavation of the disc and visual disturbances. The anterior form is the condition which has been recognised, but not hitherto satisfactorily explained, in which there is (apparent) increase of tension, along with some injection of the anterior ciliary vessels, but no excavation or visual loss. The universal form has the symptoms of both of the partial varieties, and is described in our present-day nomenclature as Simple glaucoma with rise of tension. The difficulty which has hitherto been met with in defining simple glaucoma arises from the fact that there is no one symptom which characterises all the cases. The author claims that his theory makes it possible to harmonise these cases and at the same time to differentiate them sharply from inflammatory glaucoma, which is essentially a different disease. Space will not allow us to go into his application of his theory to all the different symptoms which may accompany simple glaucoma. The main point is that increase of connective tissue in the sclera leads to an increasing degree of scleral rigidity, and that, as this increases, the true tension of the sclera is proportionately reduced until one may imagine a stage at which "tension" of the sclera, in the true meaning of the term, is lost, and the hardness of the eyeball is entirely a matter of rigidity.

If such an eye were opened, its walls would show no elastic contraction, the globe would preserve its size and shape, the aqueous would not escape forcibly, and the eyeball would feel as hard after incision as before. This, he says, is the explanation of the cases of the so-called "malignant" glaucoma, in which no fall of tension takes place when the eye is opened for the purpose of an iridectomy.

Having denied the existence of elevated tension in simple glaucoma, Stransky is faced with the necessity of explaining the excavation of the lamina cribrosa, and, although we find the result far from satisfactory, it is just here that he congratulates himself most heartily on the value of his theory, for he claims to have abolished, root and branch, and once for all, the "pressure" theory of the excavation in simple glaucoma. The acknowledged difficulties in the way of the pressure theory are all reconciled, we are told, if we dismiss from our minds the idea that rise of intra-ocular pressure is a feature of simple glaucoma, and fix our attention on the consequences of increased scleral rigidity. In the first place, the globe diminishes in diameter, and there is a corresponding decrease in the diameter of the scleral opening occupied by the lamina. Further, the scleral inflammation extends into the lamina, leading to an increase in its bulk. With an extension of the lamina and a diminishing aperture the former can only be accommodated by assuming the cupped form. He believes that the intra-ocular fluid can pass along the lymph channels which accompany the nerve fibres in their passage through the lamina, and that just behind the lamina and before the point at which the medullation of the nerve-fibres begins, these lymph channels widen out to such an extent that we are entitled to speak of a retro-laminar space. In consequence of this arrangement, the fluid pressure behind the lamina is equal to that in front of it. Hence, rise of intra-ocular pressure, as such has no more tendency to displace the lamina than it has to displace the iris. At an early stage there is no narrowing of the pores of the lamina, and thus a certain degree of cupping may coexist with good vision and field. If cupping goes on until the lamina fills the retro-laminar space, the pores of the lamina become blocked by the thicker medullated portions of the nerve fibres, and the consequent pressure on the fibres leads to progressive atrophy and loss of function.

The sequence of events in acute inflammatory glaucoma is, as follows.—Blockage of the filtration channels causes rise of intra-ocular pressure. During the attack there is no damage to the optic nerve fibres; but if the conditions persist, the lamina, and, later, the nerve fibres also, participate in the oedema of the ocular tissues, and compression of the fibres leads to loss of function. Simultaneously, the lamina ceases to be a lamina cribrosa and becomes a lamina obturata, the pressure on its anterior surface rises above that on its posterior surface, and excavation results. The severity of the effects of acute glaucoma depends on the degree and duration of the rise of intra-ocular pressure, so that we have all grades from simple prodromal attacks to the most severe fulminating form. But although simple and inflammatory glaucoma, according to Stransky's view, are essentially different diseases, there must be some underlying connection to account for such facts as the appearance, in some families, of an unusual number of cases of glaucoma, some acute and some simple; the occurrence of simple glaucoma in one eye and inflammatory glaucoma in the other eye of the same individual; the transition of simple glaucoma into the inflammatory form, and, *vice versa*; the progressive loss of sight from simple glaucoma in an eye which has been successfully operated on for an acute attack. The nature of the relationship, according to Stransky's view, is that Scleritis indurativa (simple glaucoma) predisposes to inflammatory

glaucoma. The conditions which predispose to acute glaucoma are, increased rigidity of the sclera, smallness of the eyeball, shallowness of the anterior chamber, and narrowness of the circumlental space, and these factors are only supplied by indurative Scleritis or by senility, the latter being characterised, in addition, by increase in the diameter of the lens. Acute glaucoma depends for its occurrence on the existence in the eye of both a natural and an acquired disposition. The natural disposition is present when the eye is small relatively to the other parts of the body, while the acquired disposition may be supplied by *Scleritis indurativa*, or by the effects of old age. The tendency to its occurrence is greatest when both scleritis and senile changes act together in an eye of abnormally small size.

In this volume treatment is not considered at any length, but it follows from the above statement of Stransky's theory, that in simple glaucoma he considers operative treatment of no avail, while he advocates the present-day surgical treatment of acute glaucoma.

We cannot within the limits of this review touch on all the points considered by the author, but we have given the above somewhat detailed summary of his theory, for every piece of serious work on this important subject is worthy of consideration, and a theory which offers a plausible explanation of many of our difficulties must contain some element of truth. But although we find the work suggestive, it must be pointed out that it appears to be based almost entirely on hypothesis. At every turn we find ourselves asking for proofs of the author's statements. But we ask in vain. The only proofs given are supplied by quotations from the writings of others. However, he tells us that this is only the first of two volumes, and we anticipate with interest the appearance of his further contribution, hoping that he will then be able to supply evidence that his views are soundly based on observed facts.

A. J. BALLANTYNE.

Treatment after Operation. By WILLIAM TURNER and E. ROCK CARLING. London: University of London Press: Hodder and Stoughton, and Henry Frowde. December, 1912. Price 10s. 6d. net.

This book on *Treatment after Operation*, by Messrs. Turner and Carling, includes a chapter dealing with the eye, the work of Mr. L. V. Cargill. It contains a clear account of what a practitioner may expect to find after operations upon the eye, and it is most liberally illustrated with pictures of bandages, and so forth. A good many hints on the nursing of patients whose eyes have been operated on are scattered through the thirty odd pages for which Mr. Cargill is responsible. By the way, figure 54 shows a nurse preparing swabs between the naked finger and thumb, but we suggest that the best modern practice is to insist upon her wearing sterile rubber gloves before allowing her to undertake this rather important business, even although the swabs are afterwards to be placed in the steriliser. A similar criticism applies to figure 55, where a nurse is shown squeezing lotion from a swab into an eye after operation. Obviously, in this unsurgical proceeding, the lotion might convey to the patient's eye undesirable material from the nurse's ungloved finger.

SYDNEY STEPHENSON.

CORRESPONDENCE.

[While THE OPHTHALMOSCOPE will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.]

MARSHALL'S "DISEASES OF THE EYES."

To the Editor of THE OPHTHALMOSCOPE.

SIR,

In the review of my book "Diseases of the Eyes," published in the February issue of THE OPHTHALMOSCOPE, my friend Mr. Harrison Butler criticises me on several points, most of which are matters of opinion. There is, however, one point which concerns facts which I feel I ought to mention. Mr. Butler objects to my saying that there is "practically no danger" of prolapse of the iris in the combined operation for cataract extraction, and he states that "the exact figures are from 3 to 5 per cent."

I carefully analysed 1,519 consecutive cases of cataract done at Moorfields Hospital by nine different surgeons (of which I did not happen to be one), and I found that the percentage of prolapses after extraction with iridectomy was 0.87. I therefore felt justified in saying that there is "practically no danger" of iris prolapse.

I am,

Yours truly,

C. DEVEREUX MARSHALL.

112, HARLEY STREET,
LONDON, W.
February 6th, 1913.

To the Editor of THE OPHTHALMOSCOPE.

DEAR SIR,

Mr. C. Devereux Marshall has shown me the letter printed above, and I am very grateful to him for pointing out an inaccuracy. The figures should have been "from 0.3 (Little) to 6.9 per cent. (Hæssig)." The higher percentage is associated with extraction after preliminary iridectomy. The varying statistics probably depend upon the surgeon's idea of what constitutes a prolapse. One large enough to call for excision is doubtless very rare after the operation with iridectomy, but tiny prolapses at the angles of the wound, about as large as a pin's head, are surely more frequent than 1 per cent. They are certainly more commonly seen after extraction following preliminary iridectomy; in fact, they constitute the most important objection to this procedure.

Believe me,

Yours truly,

T. HARRISON BUTLER.

26, ADELAIDE ROAD,
LEAMINGTON SPA.
February 7th, 1913.

OPERATIONS FOR GLAUCOMA.

To the Editor of THE OPHTHALMOSCOPE.

SIR,

Colonel Elliot's letter about sclerectomy calls for a reply from me, which I shall endeavour to make at once brief and complete.

For the sake of clearness, I shall follow the same order as that in which Colonel Elliot arranged the different parts of the question discussed by him in your issue of January 1st, 1913, p. 58.

(1) In the first place, I have never denied that Colonel Elliot quoted my work at the time when he published his own dealing with trephining for glaucoma. Since 1905 at Bordeaux, and 1906 at Paris, I have maintained that the cure of chronic glaucoma can be accomplished by fistulisation of the eye alone, and that this can be obtained only by an operation consisting of (a) resection of a scleral flap opposite the anterior chamber (*en face de la chambre antérieure*), and (b) mobilisation of a conjunctival flap, beneath which the resection should be made.

I willingly recognise that Colonel Elliot is acquainted with, and has quoted, all my original work dealing with this subject, and it has appeared to me, as to everybody else, that my *confrère* has been inspired by those works in himself practising an operation which essentially consists in (a) scleral resection opposite the anterior chamber (*en face de la chambre antérieure*), and (b) mobilisation of a conjunctival flap intended to cover the breach in the sclera. We may accept it as a fact, then, that in 1909 Colonel Elliot was performing, but with a different instrument, an operation similar to mine, and that after having known and quoted all my works.

(2) Colonel Elliot states that he never gave his name to scleral resection made with the trephine until after the designation had been applied to the operation by Sir Henry Swanzy, Professor Fuchs, Dr. Temple Smith, and others. That is merely to change the question. Without abandoning my claim, and with all the deference that is owing to those eminent names, I shall simply say that they were in the wrong to confound the method with the principle. My method of conjunctival fistulisation of the eye consists, as I have already said, in resecting the sclera subconjunctivally and opposite to the anterior chamber. The method may be realised by dissecting the conjunctival flap as a preliminary step (Coppez, Holth), by resecting the sclera with scissors, with the punch forceps (Holth), with Graefe's knife (Terson), or with a trephine (Elliot) etc., etc. All these procedures have no other end than to realise my method, which lies at the root of them all and which dominates them.

Elliot, Holth, Coppez, Terson, and all those who, at their own sweet will, have modified the instrumental part of my sclerectomy, only endeavour to obtain the realisation of my method: in fact, every one of them, by a special procedure, effectuates the subconjunctival anterior sclerectomy of Lagrange.

In a good terminology, then, I believe that there should not be an operation of Elliot, any more than an operation of Holth, or of Coppez, or of Terson. There is one operation, that of Lagrange, realised by different instruments, as with cutting forceps instead of scissors, lance instead of Graefe's knife, trephine instead of knife. Those are absolutely secondary details dependent upon the use and wont of each surgeon in handling this or that instrument.

These procedures are already very numerous, and will become more so, but anterior perforating subconjunctival sclerectomy is *one*, and whosoever performs it, realises the method which belongs to me.

(3) With regard to the third point, I reply to Colonel Elliot that I have never demanded that all forms of sclerectomy should be called by my name. Posterior sclerectomy I willingly resign to those who have praised it, and I leave to Argyll Robertson scleral resection opposite the ciliary body, but as regards subconjunctival sclerectomy at the level of Schlemm's canal, at the filtration angle, I do not hesitate to claim it as belonging to me absolutely, inasmuch as nobody described it before I did, and as it is the corner-stone of

all that has been written during the last few years upon fistulisation of the eye. Colonel Elliot remarks that the idea of the filtering cicatrix originated from de Wecker, a statement with which I hasten to identify myself. From the first I have, indeed, insisted upon the fact, but de Wecker (and before him von Graefe) had dreamed, and I have converted the dream into a reality by indicating a method and a *technique* whereby fistulisation of the eyeball may be obtained in 99 per cent. of the cases.

Upon this point we are in perfect accord. I was a pupil of de Wecker and know that all his life long he was haunted by the desire to obtain and animated by the hope of obtaining a filtering cicatrix, but I know also that he realised neither the desire nor the hope.

By anterior subconjunctival sclerectomy I have given substance to the dream of the great French master, and I have obtained what is even better than a filtering cicatrix, namely, fistulisation. I have in this way satisfied the whole of my ambition as regards this aspect of the question of glaucoma. Does the progress accomplished by humanity represent anything beyond the realisation of its dreams?

As to the question whether the *technique* praised by me in carrying out anterior perforating sclerectomy is the best, or if one had preferably use a trephine instead of punch-forceps, or the lance instead of a Graefe knife, those are secondary details, concerning which everybody has his preferences. Personally, I do not believe (elsewhere I will explain why) that it is good to remove a disc of sclera rather than a tongue-shaped piece, although I am happy to recognise that in the hands of Colonel Elliot the trephine has given, in executing my operation of sclerectomy, very satisfactory results, which I applaud with all my heart, but which do not surprise me, since for long I have been familiar with the great scientific and surgical accomplishments of my eminent Madras *confrère*.

I am, Sir,

Yours, etc.,

F. LAGRANGE.

I, RUE D'ENGHIEN,
BORDEAUX, FRANCE.
January, 1913.

ON THE OPHTHALMOSCOPIC EXAMINATION BY THE DIRECT METHOD WITH INDIRECT ILLUMINATION.

To the Editor of THE OPHTHALMOSCOPE.

DEAR SIR,

In an abstract in *THE OPHTHALMOSCOPE* for July, 1912, p. 381, the reviewer shows a curious misapprehension of the meaning of Haab's article with the title given above (*Beiträge z. Augenheilk.*, Heft 75). The reviewer says: "Haab, of Zürich, draws attention to the fact that small spots in the macular region, which are invisible, or barely visible, by ordinary ophthalmoscopy, are easily seen when the image of the flame (he uses an Argand burner) is thrown directly upon the spot;" and further: "We have not ourselves grasped exactly how the examination is to be made." "The text is not explicit."

To throw the light *directly* on the spot is just the opposite of what Haab recommends. He says: "There occur in the fundus, especially in the macular region: (1) Spots which one sees hardly or not at all, when one

examines with the direct ophthalmoscopic image, but which at once become distinct when one illuminates *near by*, that is when one throws the image of the flame *close* to the spot: (*Wenn man daneben leuchtet, also das Flammenbild dicht neben das Fleckchen wirft*:).” In its apparant rejection of the direct method, the sentence is doubtless misleading, but the remainder of the article makes it perfectly clear that he uses the direct method of examination, but throws the light close to, but not on, the spot to be examined. Haab further states that other spots occur in the retina which look *different* when the light falls near them rather than on them; that is, their colour and depth can be made out. He gives a number of illustrative cases and points out that the method was first used by Nagel, as a means of demonstrating the presence of blood-containing vessels in the midst of an opacity in the retina which concealed them entirely, when it was lighted directly; and he quotes the discussion of Nagel’s paper by Liebreich who asserts that vessels which look white because of the development of connective tissues about them, display a column of blood when the light is thrown near them; while vessels that look white because they are empty, are not changed in appearance by the indirect lighting. Haab also refers to the ease with which folds at the margin of a retinal detachment, and overhanging edges in some cases of choked disk, can be made out by this method. He thinks it possible, and in this he is undoubtedly correct, that the method has been used to some extent by a great many observers, but urges that it should be used more commonly.

My own attention was caught by the abstract in question because I happened to have read Haab’s important article, and because my previous experience enabled me to confirm his estimate of the value of indirect lighting. For a number of years, I have occasionally noted and called the attention of my assistants to small spots near the centre of the retina which I should pass over entirely when examining the fundus by the direct method in the ordinary way, but which could be readily seen on moving the light slowly over the fundus, at the same time *directing the attention, not to the centre of the illuminated area, but to its periphery*. I have never happened to see one in such a position that it could be told whether it was above or below the vessels, but they give the impression of being rather deep. In one case the patient was a young man in apparently good health, who complained of slight decrease of sight in one eye, for which the only cause to be found was an irregular patch of exudate, half as large as the disk, lying below and to the outside of the latter, reaching the edge of the macula. This patch was different from any described by Haab, in that it could be rather easily seen with the indirect method, looking thus like a somewhat diffuse spot of misplaced pigment; but when I attempted to examine it by the direct method, I passed it over several times before I could locate it. I finally did so by throwing the light close to the edge of the spot; when this was done, the edge nearest the light came out as if it were a rather thin diffuse pigment stain, but the spot was so large that only part of it could be seen at a time in this way. Then, knowing where it was, I could, by turning the light full on it, barely make it out by its appearing a very little lighter than the surrounding retina. I only saw the man once and do not know what became of him or his spot. In several other cases I have seen similar, but much smaller, spots of the same character, but as they were parts of a picture with other more important features, I made no especial note of them. These spots evidently were not pigmented but were simply areas which, from coagulation or some similar change in their albumen, had become opaque, and when outlined by light which was reflected from the deeper layers, they looked dark, just as a piece of chinaware would look under similar conditions. The only other use to which I have

put the indirect illumination of the retina has been in the examination of *Drüsen* in the retina and optic nerve. The globular form and translucency of these bodies is thus brought out, as in no other way. The field of usefulness of the method can hardly be said to be large, but there can be no doubt that by systematically paying attention to the periphery as well as to the centre of the lighted area, we should occasionally see things which would otherwise be overlooked.

Yours truly,

OMAHA, NEB.,
U.S.A.

H. GIFFORD.

DEAR SIR,

I am exceedingly obliged to Dr. H. Gifford for explaining a method of examination which I had not fully grasped from the original article by Professor Haab referred to. I shall in future try to utilize the method.

Yours truly,

T. HARRISON BUTLER.

LEAMINGTON SPA.

NOTES AND ECHOES.

Deaths.

A BREEZY and commanding personality, Malcolm Macdonald McHardy, passed away on February 8th, at the age of 60 years, at Dumfries, Scotland, after an illness of some duration. The funeral took place at Dumfries, and a memorial service was held in King's College Hospital Chapel.

He was the fifteenth child of the late Admiral J. B. B. McHardy, and the grandson of Lord Nelson's flag-lieutenant at Trafalgar. He was educated, generally at the Royal Naval School, New Cross, and medically at St. George's Hospital, London. He took the diploma of M.R.C.S. in 1873, and of F.R.C.S. Edinburgh in 1877. He was professor of ophthalmology in King's College, and ophthalmic surgeon to King's College Hospital, London. But his pet institution was the Royal South London Ophthalmic Hospital, St. George's Circus, Southwark, S.E., to which he was appointed surgeon in 1878, and which was rebuilt in 1890-91, under the alternative name of the Royal Eye Hospital, largely as the result of McHardy's personal efforts. He took a very prominent part in the management of that institution, of which at the time of his death he was consulting surgeon. He retired from the active staff in October, 1909. McHardy was an original member of the Ophthalmological Society of the United Kingdom, and from 1887 to 1890 occupied a seat upon the council of that society. His name was known in connection with such subjects as the removal of foreign bodies from the eyeball with the electro magnet, and the artificial maturation of immature senile cataract by trituration. He was said to be an accomplished operator on the eye.

McHardy was a hard worker, and seemed to divide his time between professional activities in London and a kind of marine residence at Margate, rushing from one place to the other in a high-speed automobile. His arrival at Margate was signalled in naval manner by the hoisting of flags and the firing of cannon. McHardy's bluff and downright manner of dealing with patients was as much liked by some folk as it was resented by others not

accustomed to his peculiarities. It is likely that many of McHardy's personal vagaries were to be accounted for on the score of a chronic nervous ailment, from which he was believed to suffer for many years prior to his demise. Perhaps



M. M. MCHARDY.

(From a bust to be placed in the Royal Eye Hospital, Southwark.)

his name will be best remembered among ophthalmic surgeons by his automatic registering perimeter, still the one in common use. He edited the fourth edition of J. Soelberg Wells' *Treatise on the Diseases of the Eye*. R.I.P.

With much regret we learn of the death, on his sixty-first birthday, of Henry Eales, the widely known and popular Birmingham ophthalmic surgeon. The immediate cause of death was syncope following influenza. The son of the rector of Yealmpton, Devonshire, Mr. Eales was born at Newton Abbot in 1852, and studied medicine at University College, London, whence he qualified in 1873, and in that year went to Birmingham as house surgeon to the Eye Hospital. He was later appointed demonstrator of anatomy and medical tutor to the Queen's Hospital, Birmingham. In 1877 he was appointed on the staff of the Birmingham and Midland Eye Hospital, and was senior surgeon to that institution at the time of his death. Mr. Eales held numerous appointments.

He was ophthalmic surgeon to the Guest Hospital, Dudley, to the Hammerwich Hospital, Cannock, and the Balsall Heath Dispensary, to name but few of them. In 1897 he delivered the Middlemore Lecture. Mr. Eales was an original member of the Ophthalmological Society of the United Kingdom, and was a member of the council from 1890 to 1893. He held office as vice-president in 1900. He presided over the Section of Ophthalmology of the British Medical Association in Birmingham in 1911. He was honorary treasurer of the Midland Ophthalmological Society. Mr Eales was last year's president of the Birmingham Devonian Society. He leaves a widow, two sons, and two daughters. His younger son is resident surgical officer of the Birmingham and Midland Eye Hospital, and was about to enter into partnership with his father, when death intervened.

The following deaths are announced from the United States and Canada :—

Dr. John T. Duncan, at the age of 59 years. Dr. Duncan was oculist to the Western Hospital, Toronto.

Dr. Charles C. Knapp, at the age of 48 years. Dr. Knapp practised as an ophthalmic surgeon at Zanesville, Ohio.

Dr. Nathan G. Ward, at the age of 47 years. Deceased was ophthalmologist to Charity Hospital, Philadelphia.

The death is announced from Berlin of Dr. Emil Cohn, at the age of 42 years.

* * * *

Appointments. MR. PHILIP E. H. ADAMS, Exeter College, has been elected Margaret Ogilvie's reader in Ophthalmology and surgeon to the Oxford Eye Hospital, in place of

Mr. Robert W. Doyne (the first incumbent of the office), who resigned last October. Mr. Adams holds the Oxford Diploma in Ophthalmology.

Mr. J. V. Paterson has been appointed ophthalmic surgeon to the Royal Edinburgh Infirmary in succession to Dr. George Mackay, shortly to retire.

Mr. John Gray Clegg has been appointed ophthalmic surgeon to the Children's Hospital, Manchester.

Mr. R. Beatson Hird has been appointed ophthalmic surgeon, for a period of 15 years, to the General Hospital, Birmingham, *vice* Mr. D. C. Lloyd-Owen, resigned.

Mr. D. C. L. Orton has been appointed honorary anæsthetist and dental surgeon to the Eye and Ear Infirmary, Liverpool.

Mr. I. Forrest Penman has been appointed house surgeon at the Birmingham and Midland Eye Hospital, and Mr. P. Verdon, ophthalmic house surgeon to St. Thomas's Hospital, London.

Mr. Edgar Stevenson has been appointed medical referee, under the Workmen's Compensation Act, 1906, for County Court Circuit, No. 29, for ophthalmic cases.

Mr. G. H. Pooley has been appointed one of the medical referees, under the Workmen's Compensation Act, 1906, for County Court Circuits, Nos 13 and 16, with a view to his being employed in ophthalmic cases arising in those circuits.

Mr. H. V. McKenzie has been appointed ophthalmic surgeon to the Newton Abbot Hospital.

Dr. Wessely has been appointed professor of ophthalmology and director of the Eye Klinik at Würzburg, in succession to Professor C. v. Hess.

* * * *

THE veteran, Julius Hirschberg, completes his seventieth year on September 18th, 1913, and a movement is on foot to celebrate the occasion by presenting him on that day with an artistic medal. An influential committee has been formed to further the project. The British names include those of Sir Anderson Critchett, Bart., Mr. W. H. H. Jessop, Mr. Edward Nettleship, Mr. Arthur MacCallan, and Sir Henry Swanzy. Contributions will be received by Dr. W. Mühsam, Berlin, W., Motzstrasse, 79.

* * * *

The Klinglefuss Magnet. A KLINGLEFUSS Ring Magnet has been installed at the Coventry and Warwickshire Hospital. The current is supplied by a rotatory transformer, which transforms the 200 volt alternating current of the town mains into a continuous current at a tension of 100 volts. This current is used for the new X-ray apparatus, and will be available for the magnet, which is wound for 100 volts. Up to the present, iron splinters in the anterior segment of the eye have been extracted with the hand magnet; patients with steel fragments in the posterior segment have been sent to the Midland Eye Hospital, Birmingham, to have the splinter removed by the Haab Giant Magnet.

Mr. Harrison Butler will be glad to show the appliance to anyone interested in giant magnets.

* * * *

A New Journal. IN April a new Journal, *Zeitschrift für Ophthalmologische Optik mit Einschluss der Instrumentenkunde*, published by J. Springer, Berlin, and edited by Prof. Greeff, Berlin, Dr. Oppenheimer, Berlin, and Dr. von Rohr, Jena, will appear every two months. A number of distinguished authors are on the staff, amongst them—Axenfeld, Bielschowsky, Dimmer, Gullstrand, Hallauer, Hertel, Hess, Landolt, Ostwalt, von Pflugh, Stock, Wessely, Wolff, etc. The Journal will cost M. 12 per annum.

* * * *

Will of the late
Mr. Arthur Benson.

MR. ARTHUR HENRY BENSON, of 42, Fitzwilliam Square, Dublin, surgeon to the Royal Victoria Eye and Ear Hospital, Dublin, ophthalmic and aural surgeon to the Royal City of Dublin Hospital, examiner in ophthalmic surgery to Dublin University, and in ophthalmic and aural surgery to the Royal College of Physicians and Surgeons in Ireland, who died on November 6th last, son of the late Professor Charles Benson, M.D., and brother of Sir Ralph Benson, left personal estate in the United Kingdom valued at £21,654 11s. 5d. Probate of his will, dated March 29th, 1899, has been granted to his widow, Mrs. Ethel Martha Benson, of 42, Fitzwilliam Square, Dublin, and Mr. John Lindsay, of Leemount, Coachford, Co. Cork. The testator left all his property to his wife, Mrs. Ethel Martha Benson, directing, in the event of his leaving no issue, the payment of a legacy of £500 to his sister, Mary Kate Benson, and of £50 to his nephew and godson, Charles Molyneux Benson.

THE OPHTHALMOSCOPE DIARY.

Section of Ophthalmology, <i>Royal Society of Medicine.</i>	March 5th (8.30 p.m.)	1, Wimpole Street, London.
Midland Ophthalmological Society.	April 1st (5.30 p.m.)	Birmingham and Midland Eye Hospital.
Ophthalmological Society of the United Kingdom.	April 24th and 25th	1, Wimpole Street, London and Moorfields Hospital, E.C.
French Ophthalmological Society.	May 5th	184, Boulevard St. Germain, Paris.
American Ophthalmological Society	May 6th	Washington, D.C.
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	May 7th 8.30 p.m.	1, Wimpole Street, London.
Scottish Ophthalmological Club	May	
Ophthalmologische Gesellschaft.	May 15th	Heidelberg.
Midland Ophthalmological Society.	June 3rd 4.30 p.m.	Shrewsbury Eye Hospital.
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	June 4th 8.30 p.m.	1, Wimpole Street, London.
Oxford Ophthalmological Congress.	July 17th and 18th	Keble College, Oxford.

Section of Ophthalmology, July Brighton.
British Medical Association.

Section of Ophthalmology, August 7th London
XVIIth Int. Congress of Medicine. to 12th.

American Academy of Ophthal- November Chattanooga, Tennessee,
mology and Oto-Laryngology U.S.A.

THE OPHTHALMOSCOPE.

A MONTHLY REVIEW OF CURRENT OPHTHALMOLOGY.

VOL. XI.—No. 4.]

APRIL 1, 1913.

[TWO SHILLINGS.

CONTENTS.

Original Communications.—

	PAGE
1. D. V. Giri, D.O.—Contact Infection of Carcinoma of the Eye	202
2. Professor Emil v. Grósz.—The No. I Royal Hungarian University Eye Hospital, in Budapest	206
3. Arthur Zorab.—“Aqueoplasty.”	211
4. S. E. Whitnall, M.A., M.B.—The Ligamentum Palpebrarum Mediale	216

Clinical Memoranda.—

1. Archibald Stanley Percival, M.B., B.C.—Trephining the Sclerotic	219
2. F. H. Verhoeff, M.D.—A further note on the “Sclerectome” ..	220

Novelties.—

A New Eyelid Retractor.—By C. G. Russ Wood, F.R.C.S.	221
---	-----

Translations.—

1. The Senile Changes found in the Human Eye. By Dr. Gustavo Attias	222
2. Guide to the Microscopic Examination of the Eye (continued). By Professors Greeff, Stock, and Wintersteiner	229

Current Literature.—

I. Pathology (first notice)	234
II. Ocular Symptoms in Intracranial Surgery... ..	240
III. The Pathology and Treatment of Buphthalmos	242
IV. The Pathogenesis of Glaucoma	242
V. Tonometry	244
VI. Operations for Glaucoma	247
VII. Miscellaneous Communications on Glaucoma	251
VIII. Metastatic Gonorrhoeal Inflammation	252
IX. Worm-like Contractions of the Sphincter Pupillæ	253
X. Remedies (third notice)	255

Correspondence	258
-----------------------	-----

Book Notices	260
---------------------	-----

The Ophthalmoscope Diary	266
---------------------------------	-----

ORIGINAL COMMUNICATIONS.

CONTACT INFECTION OF CARCINOMA OF THE EYE.*

BY

D. V. GIRI, D.O. (Oxon.),

SOMETIME CLINICAL ASSISTANT TO THE ROYAL LONDON OPHTHALMIC HOSPITAL.

Foreword.

VARIOUS theories as to the causation of carcinoma have been put forward from time to time, but none of them has been substantiated by either clinical or experimental research, so that its ætiology is still wrapped in mystery. In discussing this question, M. Borst says: "The causative factors of pathological growth are not sufficiently understood. One speaks of direct growth stimulants . . . the fostering of an independent growth-mechanism through favourable or specific irritation. . . . That chemical or physical irritation can be the primary cause of tumour-growth is doubtful Another cause of pathological growth independent of the cells is to be sought for in a change in the surroundings. Decline of resistance to growth, disturbance of tissue tension, are here the main factors. In a critical review of causes, the endogenous, congenital factor is not to be overlooked." Here there is no mention whatever either of protozoa or of bacteria as originators of new-growths; similarly, Ribbert and Ziegler take no account of them. From the foregoing it is evident that among the pathologists of to-day there are very few, if any, supporters of the protozoal or bacterial origin of tumours. Hence, the use of the term "Contact infection" in speaking of carcinoma would appear strange and inappropriate in the present state of our knowledge, and calls for a few words of explanation at the outset.

The parent tumour-cell is either a unit of an embryonic cell-nest or a normal cell which, for some unknown reason, has reverted to the embryonic type. Hence, it is endogenous, is found in the body itself. But the protozoon or the bacterium has to come from outside. This difference aside, the factors conditioning the growth and multiplication both of the tumour-cell and of the protozoon or bacterium bear a close analogy so far as the animal body is concerned. Both, as a rule, are incapable of producing pathological changes when located on an intact tissue-surface. Both must have access to the body fluids, to obtain nourishment, in order that they may live and multiply. Until the bacterial or protozoal origin of carcinoma is proved, the most acceptable explanation of the occurrence of a new growth on one surface succeeding one on another surface in constant contact with it, seems to be that the tumour-cell, getting implanted on the opposed surface, starts an independent growth. When the opposed surfaces move on each other, the friction may give rise to an abrasion, and thus favour the implantation. In view of the analogy above adduced, there appears to be no objection to the employment of the term "Contact infection." Further, the use of the term in this sense obtains sanction from Sticker, who brings spontaneous implantation tumours under the category of contact carcinoma and also considers cases where he succeeded in transferring the vaginal carcinoma of a bitch to a dog by means of the

* From Professor Fuchs' Klinik, Vienna.

sexual act to be of the same nature. In *Lubarch-Ostertag* XIII, 2, 1909, from which Sticker is quoted here, there is also the observation that "the so-called implantation carcinomata stand in a special relation to the infectivity of carcinoma." Hamburger is altogether unhesitating in the use of the term "contact infection." In *Hosp. Tid.*, 3, R. X, 4 of 1892, he reports the case of a woman, 50 years of age, who had a tumour on the left labium minus. In the course of two years it grew so big as to occupy the whole of the left side of the vulva, but, did not cross over the middle line either in front or behind. There was no infiltration progressing towards the right side to be discovered in the depth either. In the course of some months the tumour ulcerated and discharged offensive pus. Shortly after the commencement of the ulceration, there developed on the inner side of the right labium minus, between the middle and posterior third, on a spot which was in constant contact with the tumour-mass on the left side, a small wart, which in about a month, became walled in by an ulcer with projecting edges. On the 16th of October, 1891, both the tumours were extirpated. In the middle of the small tumour was found what appeared to be the normal duct of Bartholin's gland. The microscopic examination showed that both the tumours were typical flat-celled epitheliomata, and that the duct of Bartholin's gland was normal, lined with simple cylindrical epithelium. From this case Hamburger infers that a transference by contact could hardly be doubted, as, although the possibility of multiple primary carcinomata starting from Bartholin's gland could not be excluded off-hand, the microscopic examination proved the tumours to be typical flat-celled epitheliomata, whereas the duct of the gland was lined with cylindrical epithelium.

Cases of contact-carcinoma are so rare that they may well be looked upon as clinical curiosities. In speaking of the modes of propagation of carcinoma in the body, M. Borst says: "Another method of propagation is through implantation of cancer-cells on serous surfaces—peritoneum, pleura, pericardium. Other implantations, for example, in the alimentary canal or from upper lip on lower lip, are much more scarce and must be very critically judged." This observation is verified by the fact that Hamburger at the time of reporting the above quoted case could find in the whole literature only seven cases of transference of carcinoma by contact, of which four affected the vulva. One has not found any further cases on record since. What is of singular interest with regard to this paper is, that the literature contains no instance of contact-tumour concerning the eye and its appendages. Hence, we venture to place on record the two striking and noteworthy examples of contact-carcinoma affecting the lids and cornea to be now described.

Cases.

Case I.—H. M., a woman of 75, was admitted into Professor Fuchs' Klinik with the diagnosis: *Carcinoma oc. sin.* Owing to want of intelligence on the part of the patient, it was not possible to ascertain the time of origin of the tumour and other details.

State on Admission.—R.E.—Externally quite normal. L.E.—The lower lid is ectropionised, especially in its outer third, so that when the eye is shut a fissure, 2 mm. broad, remains open on the outer side. On opening the palpebral fissure, a nodular tumour, covering the whole front of the eyeball, comes into view. On account of the impossibility of everting the lids, the margins of the tumour cannot be made out.

Operation.—Removal of both eyelids and of the whole contents of the orbit.

Pathological Examination.—The front of the eyeball is occupied by a large epibulbar carcinoma, which leaves the fornices free (Fig. 1). The lower lid is

thickened and shows irregular epithelial down-growths in the form of loops and spurs proceeding from the lid-margin towards the tarsus. In one place one of these down-growths develops into a very well-marked large epithelial pearl. Nearer the tarsus there is a second smaller but quite definite

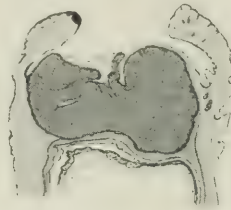


Fig. 1. Natural size. Anterior half of a vertical section of the eyeball with the lids, showing the epibulbar carcinoma and the infected border of the lower lid. The affected area of the lower lid is represented in deep black. (Case I.)

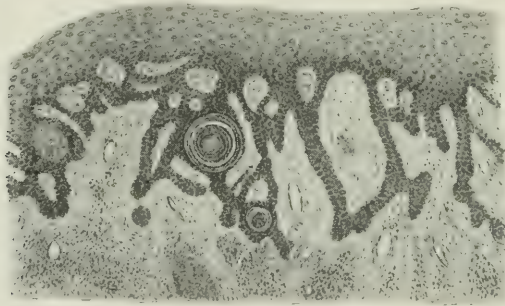


Fig. 2. Size $\frac{1}{2}$. The infected border of the lower lid, showing the carcinomatous infiltration and the epithelial pearls. (Case I.)

pearl connected to the larger by a string of invading cells. There is a slight leucocytic infiltration in the invaded area. (Fig. 2.)

That the lid affection is not a growth by continuity is evident from the fact that the fornices and the other parts of the lid show no epithelial invasion.

Case II.—A gentleman, 58 years of age, exhibited in 1906, the following condition of his right eye:

Lid margins reddened; palpebral fissure somewhat narrow; palpebral conjunctiva strongly injected; papillary hypertrophy getting more pronounced towards the internal canthus; the nasal half of the ocular conjunctiva, as also the caruncle, injected. In the middle and deeper layers of the cornea is an infiltration consisting of light fine lines converging at an acute angle towards the limbus and occupying the inner $\frac{3}{4}$ of the cornea. The deeper parts, so far as visible, are normal. *Vision*: light perception, with normal projection.

The patient was treated with different lotions and ointments for what was taken to be a chronic catarrh of the conjunctiva. In the course of the treatment a small yellowish protrusion was seen to develop on the border of the upper lid. It was scraped out. Later on, two small tumours, looking like sebaceous cysts, appeared on the border of the upper lid; the larger of the two proved, on incision, to be hard and fibrous. This was done in October, 1907. The patient did not appear again till January, 1908, when the *right eye*

shewed macula corneæ, pannus, much thickened conjunctiva, no scars, no granules, and very large blood vessels passing over from above on to the cornea, as in trachoma. In the superficial layers of the cornea a cloudiness composed of fine points of infiltration; in between these points visible lines branching like a system of veins. The deeper parts appeared to be normal.



Fig. 3. Natural size. Anterior half of a vertical section of the eyeball with the lids. The affected areas of the cornea and lids are represented in deep black. (Case II.)

As treatment with ointments, warm compresses, etc., for several weeks, did not in any way better the condition, a peritomy was performed. The excised conjunctiva was examined pathologically by Dr. Meller, and found to be normal. Transient amelioration.

In the beginning of 1909, there developed a tumour on the upper lid, which at first made one think of a chalazion. As within the course of fourteen days, the tumour grew rapidly and attained the size of a hazel-nut, it was extirpated. Pathological examination by Dr. Meller proved it to be in the nature of a carcinoma. Soon after, exenteration of the orbit, with removal of the lids, was performed. Two years later, the first local recurrence showed itself in the form of a weeping eczema, affecting the skin covering the floor of the orbit. Then a flat, soft tumour arose under the skin. Radical operation by Prof. von Eiselberg, followed by X-ray treatment. But the development of an exuberant carcinoma penetrating into the posterior nares could not be prevented. The patient died in the autumn of this year.

The left eye was highly myopic ($-13D.$), but otherwise healthy.

Pathological Examination.—Both lids are thickened at and in the neighbourhood of the border, the thickening being more pronounced in the upper than in the lower lid. The upper lid shows dense irregular down-growths of epithelium, proceeding from the lid border towards the tarsus. The tarsus itself is invaded by the growth, so that nodules of carcinoma have replaced the Meibomian glands to a large extent. Almost all the glandular structures in the lid have been invaded by the growth and in many places altogether replaced by it. In front of the tarsus, lying somewhat deeper in the lid than the down-growth from the margin, are a number of islands of carcinoma, which appear to be glands of Moll and Zeiss that have undergone carcinomatous change. Lying also in front of the tarsus, but higher up in the lid than these islands, there is a circular patch, necrotic in the centre, most likely a hair follicle that has similarly undergone a malignant change. The tubular glands just above the tarsus, as also Krause's glands, near the fornix, prove themselves to be carcinomatous. The fornix itself and the adjacent part of the lid, which shows some papillary hypertrophy, manifest no carcinomatous infiltration.

The lower lid also shows epithelial down-growths proceeding from the border towards the tarsus. But the tarsus and the glandular structures, as also the fornix, are unaffected.

The Cornea.—The superficial layers are invaded by epithelial down-growths both above and below corresponding to the areas of constant contact with the lids. Bowman's membrane is destroyed towards the periphery of the cornea both above and below by the invading growth. The central parts of

the cornea are free from neoplastic changes. There is some amount of leucocytic infiltration both in the lids and in the cornea in the invaded areas.

Remarks.

In Case I, the tumour evidently started as an epibulbar carcinoma, and, judging from its size and extent, must have been, owing to the negligence of the patient, allowed to continue its growth for a number of years, during which the lower lid obviously got implanted with the cells of the epibulbar tumour, which set up a new growth in it.

Case II appears to have been at the start one of carcinoma of the upper lid, leading later, from infection by contact, to a carcinoma of the margin of the lower lid and likewise of the cornea. The milder infiltration and the non-involvement of the glands in the lower lid as compared with the upper lid in which the downgrowths are dense and almost all the glandular structure have become carcinomatous, leads one to think that the lower lid was infected by the upper. The infection of the cornea occupies two separate areas—the upper and the lower third of the cornea—corresponding to the places of contact with the upper and lower lid respectively. The infection of the lower third of the cornea by the lower lid makes it probable that the affection of the lower lid was also of some considerable duration. What is very striking with regard to the tumour in the upper lid is that it involves almost every glandular structure and even a hair follicle.

My warmest thanks are due to Hofrat Prof. Fuchs not only for his kindness in providing me with the cases above described, but also for his invaluable help in the preparation of this communication.

REFERENCES.

- (1.) Graefe-Sæmisch.—*Augenheilkunde*: II. V., "Krankheiten der Augenlider"; II., IV. "Conjunctiva Cornea, und Sklera."
- (2.) Nagel's *Jahresbericht über die Ophthalmologie*.
- (3.) Parson's "Pathology of the Eye."
- (4.) Collins and Mayou, "Pathology and Bacteriology of the Eye."
- (5.) Borst's "Geschwulste."
- (6.) Aschoff's "Pathologische Anatomie."
- (7.) Ziegler's "Anatomie und Pathologie."
- (8.) Ribbert's "Pathologische Anatomie."
- (9.) Lubarch-Ostertag *Jahresbericht*.
- (10.) Schmidt's *Jahrbücher*.
- (11.) Fuchs's "Lehrbuch der Augenheilkunde."
- (12.) Weeks's "Text-Book of Ophthalmology."

THE No. 1 ROYAL HUNGARIAN UNIVERSITY EYE HOSPITAL IN BUDAPEST.

BY

PROFESSOR DR. EMIL VON GRÓSZ,

AULIC COUNCILLOR.

BUDAPEST, HUNGARY.

THE First Royal Hungarian University Eye Hospital at Budapest—after Vienna the oldest—rightly bears on its façade the date 1801, for it was in that year founded with six beds in two rooms; being the oldest ordinary chair of ophthalmology, for that of Budapest was founded in 1816; while the *ordinariat* of Vienna was only founded in 1818.

At the beginning of the thirties, when the Medical Faculty of the University



MAIN ENTRANCE.

removed its quarters from the Jesuit Convent, Semmelweis-utca, the five hospitals together had fifty-four beds, of which nine served for eye patients. The professor of ophthalmology at that time was John Fabiny, whose treatise of ophthalmology had been translated into Italian and Dutch.

The year of treaty, 1867, found the Eye Hospital in the same building. The number of beds was then twenty-four, increasing under Professor Lippay to forty, after the rest of the hospitals had removed.

Professor William Schulek succeeded to the directorship in 1874.

In 1884 the new headquarters of the Medical Faculty were ready, and the Eye Hospital was accordingly installed therein.

The number of patients treated in the last quarter of the nineteenth century showed a remarkable increase, the out-patients rising in one year from 3,500 to 14,000.

In these circumstances, having then succeeded to the chair of ophthalmology, I considered it my duty to endeavour to convince the authorities of the necessity of building a new home for the Eye Hospital.

The new Eye Hospital was erected in 39, Mária-utca, and stands quite detached on all sides. Its front towards the south-east, is 70 meters long, and is divided from the street by a garden four meters broad.

In the basement are the two-roomed quarters of the porter, stoker, and one servant; also a wash-kitchen, the x-ray and microphotographic room, the disinfecter, boiler, and store-houses.

On the first floor are the rooms provided for out-patients, for instruction, and laboratories. Out-patients of the Polyclinic have a separate entrance, leading by an easy ascent to the waiting room, so that those who are blind, or nearly so, have no steps to climb. The waiting room, which has an area of 98 square meters, leads into the treatment room, adjoining the operation room for the out-patients.

In a room of the waiting hall the new patients are registered, afterwards being admitted in batches of twenty to the ordination room, adjacent to the examination room, with a cabinet for perimeter examinations, and the ophthalmoscopic room.

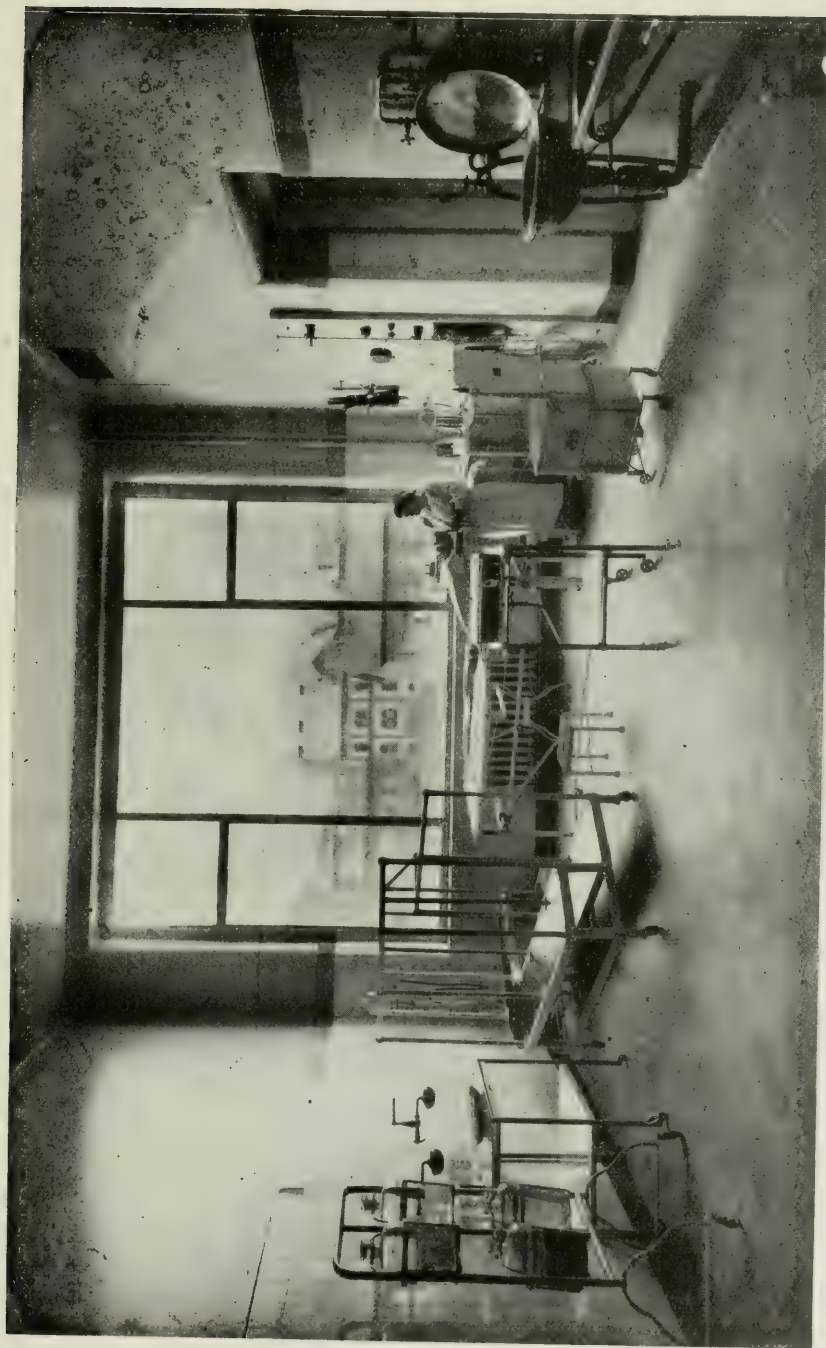
To the right of the main entrance is the porter's room and a study, with the telephone switch board, then follow the optical laboratory, the bacteriological laboratory, the histological laboratory, and, finally, the library.

On the first floor, but beyond the court, are likewise the course room for ophthalmoscopy, the professor's room with ante-chamber, the practice room for operations on the eyes. The lecture hall has a private entrance from the court.

On the second floor are treated those cases which require no operation; to the right is the women's department, to the left the men's.

On each side of the street is an isolation room, also two patients' rooms with six beds, between which is a nurse's room with two beds, then a patients' room with eight beds, and a recess for a nurse. In the latter patients' room each case has 9.45 square meters of space; in the six-bedded rooms 8.45 square meters per patient. Along the garden front are the day room, tea kitchen, and a spare room with two beds; also a bath with dressing room, and a lavatory with antechamber. In the centre is a treatment room of 5.30 by 6.90 square meters in size; beside which is a room for ophthalmoscopy, and, on the other side, the room for the doctor on duty.

On the third floor are lodged the patients who have been the subjects of operation. Here the two side patients' rooms are lacking, their place being taken by terraces. Otherwise the plan is the same as on the floor beneath, except that above the isolation rooms on both sides of the staircase there is



Aseptic Operating Theatre

a room for preparation ; and above the treatment room is the aseptic operation room, on one side of which is the sterilizing room, and on the other the instrument room.

On the fourth floor, in the centre of the building, live only the assistants, whose rooms are situated on the street front.

Along the garden front are the two rooms of the head nurse, the common sleeping apartment of the maid servants, and the washing and the bath room.

The patients' rooms bear the names of the first pioneers of ophthalmology : Arlt, Beer, Bowman, Daviel, Desmarres, Donders, Fabiny, Graefe, Helmholtz, Hirschler, Mackenzie, and Schulek.

The medical staff consists of the directing professor, four assistants, and four salaried practitioners; the auxiliary staff of an amanuensis, a day labourer, a type-writer, a head nurse, fourteen nurses, a mechanic, a stoker, a porter, three men servants, and eight maid servants.

The total cost of the Hospital, including building, furnishing, and value of the articles taken over from the old clinic, may be estimated at 900,000 Crowns.

Instruction.

According to the laws our University promulgated in the year A.D. 1806, ophthalmology was placed in the third year of the medical training and the second year of the surgical.

In the reconstructed rules of 1851, ophthalmology was transferred to the fifth year of the medical training, practical courses being also established at the Eye Hospital.

Later on, in 1875-76, the laws determined that ophthalmology should comprise six months, the course consisting of ten hours weekly, and should form one of the subjects taken in the second graduate examination.

Finally, it was decided in 1901 that the training should last two whole semesters consisting of ten hours a week, and that the subject of the third examination should be ophthalmology.

Since 1905, the training has been a thoroughly practical one. Daily, from 10 to 11 a.m., the students are present at the oral courses, afterwards attending demonstration courses on patients. The course is perfectly systematic, embracing both the theoretical and practical, taking in all the branches of ophthalmology. The number of patients used for instruction amount to about a thousand during the year.

The students are admitted in alternate groups of ten to be present at operations in the morning, and walking the Hospitals in the afternoon, during which they write their clinical observations.

The number of the groups is therefore limited, so as to enable every student a minute observation of every detail of the operation, and to follow the progress of the disease during the afternoon Hospital visit.

Besides the Professor's course, there are three University lecturers (*privat-dozenten*) who deliver free lectures at the Eye Hospital on the methods of examining the eye, on the diagnosis of eye disease, and on eye surgery.

Finally, there is at the disposal of students a library, containing about 4,000 volumes and 28 periodicals, and a laboratory, fully equipped with all scientific matter, open to all who are desirous of enriching their knowledge and for personal enquiry or experiments.

Statistics.—In 1912 the number of new out-patients was 17,610, and of in-patients 1,306. The more important operations performed numbered 1,472. The names of 350 students were enrolled.

“AQUEOPLASTY.”

BY

ARTHUR ZORAB,

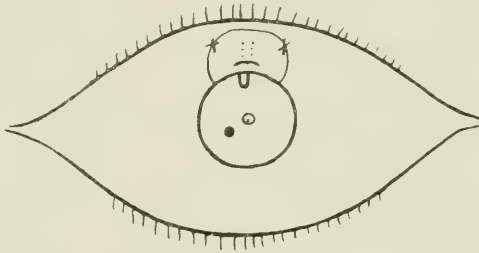
LATE I.M.S.

HONORARY SURGEON TO THE FREE EYE HOSPITAL, SOUTHAMPTON, ENGLAND.

ON March 14th, 1912, I read a paper before the Ophthalmological Society of the United Kingdom describing an operation I had devised for the relief of increased intra-ocular tension, and was then able to exhibit two cases. In THE OPHTHALMOSCOPE for May, 1912, I published a description of the operation, together with brief notes of the first few cases.

These accounts were in the nature of preliminary contributions. With the passing of time, and with a somewhat larger list of cases. I feel I may, without apology, now venture to record my observations, in the hope that, should they be considered worthy of notice, much benefit may be derived from such criticisms as are forthcoming.

As the operation (which, for want of a better name, I here call “Aqueoplasty”) has already been fully described in the above-mentioned places, I shall here give merely the baldest outline of it.—The anterior chamber is drained into the subconjunctival space by means of a silk thread. The site chosen is the upper part of the globe. A large conjunctival flap is first raised. An incision with a keratome is then made through the sclerotic into the anterior chamber. A bend of silk is passed into the chamber, so that the loop lies anterior to the iris, the distal ends of the silk lying outside the globe, on the exposed sclerotic. The flap of conjunctiva is then replaced and stitched in two places (*vide* diagram).



It is at once obvious that the procedure has been based on Sampson Handley's well-known treatment of certain obstructive œdemas by lymphangioplasty.

To avoid confusion, I shall divide my remarks as follows:—

(1) *Applicability*.—Speaking generally, aqueoplasty may be performed with safety in all cases where the intra-ocular tension is pathologically raised, and where it is necessary to reduce it, either temporarily or permanently. If a permanent result is desired, the silk is left in. If a temporary result is aimed at, the conjunctival stitches are omitted at the operation. Indeed, it would not be necessary to raise a conjunctival flap. I see no reason why a simple paracentesis having been performed, a bend of silk should not be inserted. The silk can be easily removed at any time.

(2) *Contra-indications*.—An unhealthy state of the conjunctiva renders a successful result highly improbable. The ends of the silk become exposed, and eventually the silk has to be withdrawn. Also, if the upper part of the globe be not available for the site, it may be wiser to choose one of the other

operations. If there is anything in the way of narrowing of the palpebral aperture, or shrinking of the conjunctival membrane from old trouble, the operation is rendered less desirable.

(3) *Difficulties of technique.*—I may conscientiously say there are no inherent difficulties. The insertion of the bend of silk through the sclerotic wound used to be rather a trying matter, but by using a very fine pair of iris forceps, from which the teeth have been filed off, I find I can insert the silk quite easily. If eserine has been properly used, and the pupil is small, there is no appreciable danger of wounding the lens-capsule. In raising the conjunctival flap, the insertion of the superior rectus muscle is to be avoided.

(4) *After-treatment.*—Instillation of eserine twice a day for two days, and keeping the eye covered for the same period to prevent rubbing of the upper lid against the conjunctival stitches. The stitches may be removed on the fifth or sixth day. In some cases the anterior chamber is re-established in two or three days—in others in rather a longer time. Why this should be so, I cannot yet say. The conjunctival condition is instructive. For the first two or three days there is a well-marked œdema—most marked in the region of the flap—due, no doubt, to escaping aqueous, which soaks the first dressing. Gradually, the œdema subsides in other regions, but persists over the ends of the silk. In six weeks or two months the presence of œdema in this area can only be shown by pressure; the ends of the silk are distinctly visible through the translucent conjunctiva.

(5) *Remarks.*—Internal drainage, as provided by iridectomy, has been found unsatisfactory in chronic simple glaucoma, and all the more modern operations have been devised with the view of providing external drainage. In both sclerotomy and trephining, a hole is made through the tough coat of the eye. It is anticipated that this will become closed, but the new tissue is supposed to be permeable to intra-ocular fluids, which can thus escape into the sub-conjunctival space. In other words, a leaking scar is supposed to be formed. Much controversy on this point has left us very much where we were before, but there appears to be no doubt that the tension is reduced. Sampson Handley has shown us a much more certain way of establishing drainage from one part of the body to another, and in Aqueoplasty I have applied his methods to the eye. There is no problematical drainage here, but a simple channel which there is reason to anticipate will remain open. If after some years, the drainage should become inefficient, what could be simpler than to remove the old silk, give the eye time to quiet down, and then repeat the original operation? and all with a minimal interference with the tough coat of the globe. I think my series of cases will suffice to show that there is no undue risk involved in introducing a foreign body, so long as rigid asepsis is maintained.

In offering my notes of cases for inspection and criticism, I am painfully aware of the fact that there is not a single tonometric reading in the whole series. Up to now, systematic tonometric recording has been impracticable, so I have had to rely wholly upon my sense of touch. This is, I admit, of no value as evidence to a critical profession. I am, however, so satisfied as to the reduction of tension produced in successful cases (by which I mean those cases in which the silk is retained) that I mean to continue the treatment. Apart from simplicity of *technique* and the promise of a permanent drainage, there is the advantage of non-interference with the uveal tract. I am no ranter against "mutilation of the iris," but if our object can be attained without damaging that organ, I think it is a gain.

When allowance is made for the very limited number of cases I have done, for the fact that there was no experience, either my own or recorded by others, to guide me in the selection of cases—it will, I hope, be admitted

that the results to date are encouraging. No operative *technique* can be perfected without plenty of material to practise on. I therefore hope that surgeons with greater opportunities than myself, with greater operative skill, more trained assistance and better appliances, will not hesitate to try Aqueoplasty. Their results may be no better or no worse than mine, but with their more accurate records, and with the increased number of cases themselves, ophthalmologists will the sooner be able to make up their minds as to the value of the procedure. It must, of course, be patent to everyone interested that the subject is well worthy of thorough investigation.

The notes in detail are added at the end of this communication, but a brief analysis may be here given:

I have so far operated on twenty-one eyes in sixteen cases. Six eyes underwent the old or "needle" operation, *i.e.*, the silk was introduced subconjunctivally into the chamber by means of a threaded needle—see THE OPHTHALMOSCOPE, May, 1912. One eye had first the "needle" operation, and later the "flap" operation, and fourteen eyes underwent the "flap" operation. There was no selection in the cases—they were taken consecutively. The silk has been, at one time or another, removed from nine eyes; in the remaining twelve eyes the silk is still retained. Of the nine eyes from which the silk has been removed, four eyes had undergone the "needle" operation, and five the later "flap" operation. I have definitely abandoned the "needle" operation, as so much force was necessary to pass the needle in and out of the chamber that the conjunctiva was frequently torn. Hence the silk had to be removed from four eyes, *viz.*: Case 2, right eye; Case 3, left eye; Case 4, right eye and Case 6, left eye. The last of these (Case 6, left eye) was lost eventually. The full history is this.—Iridectomy performed on it some time in 1910. Tension had recurred. The conjunctiva was chronically thickened, and always more or less injected. Silk was passed by the needle method on November 9th, 1912. Three weeks later, it became exposed and was withdrawn. The eye quietened down. The patient came up frequently for examination. Tension increased steadily, so on January 1st, 1912, silk was again inserted, but by the flap method. Owing to the presence of the coloboma following iridectomy, the external aspect of the globe was chosen. To cut a long story short, the patient went home quite comfortable; developed an acute conjunctivitis; the silk became exposed; and panophthalmitis supervened, and the eye was lost.

Of the five eyes that underwent the flap operation and from which the silk had to be removed, the histories are as follows.—Case 8. Shortly after operating, I went away on my holiday. The patient presented himself during my absence, with the ends of the silk exposed. The silk was removed, no attempt being made to cover the ends again. The eye was quiet. The next (Case 11) is of some interest. The patient had received a blow on the eye some week or so before presenting herself. When I saw her she had no light perception, no red reflex, a slightly distorted pupil, and a stony-hard eye very much injected. She had been in extreme pain, and had had no sleep for the last two or three days. She was aged 65 years. It was a question whether the eye should be removed at once to afford relief, or whether an attempt should be made to save the eye. I decided on the latter, and did Aqueoplasty, but with the intention of removing the silk when the eye had become quieter and the tension lower. No doubt in a case like this iridectomy might have answered equally well. However, the silk was inserted, and the flap was not stitched. The relief was immediate and lasting. The eye quieted down, the drainage being excellent. In about a week the chamber was well formed. Gradually, the vitreous hæmorrhage cleared, and a good red reflex was obtainable.

Vision was never restored beyond light perception. It was now obvious that she had a dislocated lens, which was only suspected before. In spite of the presence of the silk, the tension was rising gradually. I decided to extract the lens, so, as a preliminary, withdrew the silk to let the area of operation quieten down. In under a week the globe was stony hard and the eye very painful, although there was no longer any injection or vitreous hæmorrhage. I extracted the lens with the loss of a bead of vitreous (an iridectomy was necessary) and she has done well since. Her vision, of course, is negligible. Hence, in this case, Aqueoplasty was done for temporary effect only.

In the next case, No. 13, both eyes were operated on. In both there was ectropion, and chronic conjunctivitis, with shrinkage. In both the formation of a satisfactory conjunctival flap was not possible, and the silk had to be removed. In view of this case and Case No. 6, I have decided not to attempt the operation except where the conjunctiva is quite healthy—a point mentioned under the heading, "Contra-indications." The last of the five is Case No. 14. The conjunctivæ were quite healthy, but the patient had had iridectomy performed upwards, in 1910, in both eyes. Tension had recurred, and I passed a silk thread from below. The silk became exposed in a very few days and I removed it. I shall, however, try to find a satisfactory area for these cases, although I think that the chances of success here are much less.

Of the twelve eyes in which the silk had been retained, three had the needle operation, and the remaining nine had the flap operation. Two of these cases—Nos. 2 and 9—have not reported themselves since leaving the Hospital, so I presume they have had no trouble.* All the others have been seen fairly recently, and are quite satisfactory—the tension being natural and the eye quiet, with the silk easily visible. Some of the cases are rather recent, but there are a few that date back more than a year.

Notes of Cases.

1. G. S.—Right eye almost blind; T. + 2; disc deeply cupped. Aqueoplasty painful (needle method) on July 6th, 1911. No trouble since. When last seen—November 8th, 1912—eye quiet, silk in position; T.n.; no pain.

2. W. T.—Both eyes T. +; both discs cupped; both visual fields contracted. No colour perception. Aqueoplasty (needle method), right eye on August 21st, 1911, conjunctiva torn. Two days later ends of silk were still exposed, so it was withdrawn. Left eye: Aqueoplasty on August 30th, 1911. Needle passed directly through cornea into the chamber, then through angle and out sub-conjunctivally. One end of silk lying free in aqueous chamber, the other in sub-conjunctival space. When patient left Hospital, 14 days later, there was no trouble, and T. was down. He has not presented himself since.

3. W. S.—Iridectomy for chronic glaucoma on April 6th, 1910. Eye had gone blind (L.V. = shadows doubtful), disc deeply cupped and atrophied, eye painful. First seen by me on March 24th, 1911. Right eye stony-hard, blind, and painful. I was not at that time Surgeon-in-Charge. When I next saw him, in September, 1911, the condition of the eye was the same, and pain was distressing, so, on September 13th, I passed in a silk thread by the needle method. On September 19th he was discharged; eye quiet; T.n. On September 23rd silk became exposed, so it was withdrawn. Seen frequently since. As tension has not recurred, and he has no pain, nothing more done. Last seen on September 27th, 1912.

4. Mrs. C. F.—Left eye stony-hard, blind, and painful. Disc deeply cupped. Right eye T. +; disc cupped; field contracted. On October 24th, 1912, silk passed by needle method on right eye. Discharged on October 30th, eye quiet. Re-admitted on November 25th, silk exposed, so it was removed. T.n. at the time and has remained so. On December 7th, 1911, silk passed in left eye by flap method. Tension came down and pain was relieved. When last seen—November 22nd, 1912—silk in position, conjunctiva over distal ends rather red and œdematous, but T. + Tension of right eye, from which silk had been removed, satisfactory.

5. R. H.—Left eye vision failing; T. + Silk passed by needle method. Point of needle certainly entered the chamber at time of operation, but silk appears to be lying just at the limbus. Has a broad arcus senilis, so not possible to see if silk is actually in the chamber. When last seen—October 4th, 1912—T. satisfactory; vision as before operation.

*In one case, No. 4, left eye, the silk is in position, and the conjunctiva over the ends is rather red and œdematous, but the tension is high, plus 1 or more. The eye has been blind for many years, and was stony hard before the operation.

6. R. P.—Had had iridectomy in 1910 on left eye. Tension had recurred; vision failing; disc cupped; field contracted. Silk passed on left eye on November 9th, 1911. A few weeks later it became exposed, so was withdrawn. Seen frequently—tension increased steadily, so on January 1st, 1912, silk inserted by flap method. Owing to iridectomy, outer aspect of globe chosen for site of operation. Silk became exposed shortly after, but was successfully covered by stitching conjunctiva. He went home—T.n.: eye quiet. He came again on April 22nd with acute conjunctivitis; the ends of silk exposed; iritis and hypopyon. Silk withdrawn at once, but panophthalmitis set in and the eye was lost. Right eye stony-hard, blind, and painful. Silk passed by flap method on March 27th, 1912. When last seen—November 12th, 1912—the eye was quiet; silk in position, T.n. and no pain. He had had rises of tension in this eye on various dates when I had examined him.

7. G. F.—Before operation R.V.=0/60; L.V.=6/36. Both eyes T.+; both discs slightly cupped. Vision field not much contracted in left eye. Aqueoplasty (flap) on right eye on February 13th, 1912. No trouble. Operation on left eye, March 4th—no trouble. When last seen—August, 1912—R.V.=6/60; L.V.=6/24—both eyes T.n. At times his vision with both eyes together has been 6/12.

8. E.—Sub-acute glaucoma. Right eye vision failed rapidly from 6/12 to hand-movements. T.+2. Silk passed by flap method on May 4th, 1912. Rapid improvement. T. became natural and V.=6/18 when he left. Returned on June 20th with ends of silk exposed. Silk removed and eye quietened down in a few days. Not been seen since.

9. L.—Right eye, chronic glaucoma. T.+; vision failing. Operation (flap) on May 20th. Did very well; eye quiet and T. natural when he left the Hospital. Last seen on June 17th.

10. Mrs. B.—Before operation, T.+2; vision, left eye=counts fingers at 8 feet. Right eye natural. "Flap" operation—silk passed on May 20th. No trouble. Seen on June 4th: L.V. c.+1.0 sph.=6/18, and tension low, silk in position. Last seen on November 22nd. She had had no pain or any trouble in the interval. The left pupil was rather wide; silk in position; the loop rather pressing on the iris. Tension was natural, and vision=6/24 with glasses.

11. Mrs. H.—Blow on the right eye some short time before coming up. Tension stony-hard; great pain; pupil distorted; no red reflex and no light perception. Left eye natural. Silk passed in right eye by flap method on August 14th, but conjunctival flap was not stitched. Tension reduced at once, and eye quietened down. No pain, and the vitreous hæmorrhage cleared; *ends of silk were exposed all the time*. It was now obvious that she had a dislocated lens, and the tension was rising. It was decided to extract lens, so silk was withdrawn, as a preliminary, on October 15th. On October 21st, T. was very high again and eye painful. On November 5th, extraction of lens with iridectomy. Recovery uneventful.

12. Mrs. B. H.—An anomalous case of high tension. She had had double optic neuritis after some febrile complaint which had left her a physical wreck. Vision of both eyes greatly impaired. Later, she had a slight attack of iritis in left eye, which yielded rapidly to warmth and atropine. When recovered from this, she developed very high tension. Discs were not cupped; left eye very painful, and tension stony. Aqueoplasty performed August 17th. No trouble. Tension came down to normal at once, and has remained so. When last seen—November 8th—eye quiet and silk in position. She has considerable photophobia in both eyes, and is suffering from optic neuritis. The right eye appears to be following a similar course.

13. Mrs. M.—Both eyes, vision failing, fields contracted, and tension raised. Both discs cupped. Chronic conjunctivitis with shrinkage of conjunctiva in both eyes. Operation on right eye August 20th; tension came down. Operation on left eye September 2nd; tension came down. On September 11th, silk exposed in left eye, so silk removed. On September 17th, silk exposed in right eye, so silk removed. Both eyes quiet.

14. Mrs. H.—In November, 1910, had had iridectomy performed on both eyes for the relief of tension. When I saw her, two faultless colobomata; both discs cupped; both visual fields minute, and both eyes T.+. Vision was reduced to "hand movements." On October 10th I did Aqueoplasty on the right eye. Owing to coloboma, silk passed in from *below*. No difficulty at the operation, but the silk ends became exposed in a few days, so silk was removed; eye quieted down. When last seen—November 22nd—tension had recurred.

15. V.—Right eye—cataract extraction some months previously. Did very well. Fundus natural. Vision of left eye was poor—doubtful 6/24. This failed rapidly. Cornea became slightly hazy and T.++. He was admitted and Aqueoplasty performed by flap method on October 26th. Did very well. Discharged on November 5th—T.n.; eye quiet, silk in position. Seen again on November 12th and 19th—T.n, silk in position; cornea clear, disc cupped.

16. C—Gave a history of having lost sight of left eye suddenly. When first seen, both pupils had been dilated by his doctor, who had examined his fundus to find cause of blindness. Both anterior chambers very shallow. Left disc deeply cupped and atrophic; T. stony—no light perception. Right disc deeply cupped, T.+; field of vision much contracted. Aqueoplasty on right eye by flap method. Patient rather troublesome and would displace coverings of eye after operation. Had some conjunctival hæmorrhage, but did well. When he went out—November 11th—the eye was quiet, silk in position, and tension natural.

THE LIGAMENTUM PALPEBRARUM MEDIALE.

Why its removal in ablation of the Lacrymal Sac does not necessarily entail Ectropion of the lower eyelid.*

BY

S. E. WHITNALL, M.A., M.B.,

SENIOR DEMONSTRATOR OF ANATOMY IN THE UNIVERSITY OF OXFORD, ENGLAND.

IN some methods of operating for removal of the Lacrymal Sac it is advised that the overlying *Ligamentum Palpebrarum Mediale*, or *Tendo Oculi Internus*, be removed, and the statement is made that no ill effects, such as falling away of the lower eyelid from the globe, follow this procedure, although no reason can be assigned for the absence of such a disfigurement. A study of the disposition of the structures around the Lacrymal Sac with especial regard to the direction in which the medial attachments of the lower eyelid run, and in which the action of any force tending to draw the lid away from the globe would be exercised, will show that there is good reason for the absence of ectropion after such operation.

The chief points concerned in the anatomy of this region are as follows.—

(1) The *Lacrymal Sac* lies in the Lacrymal Fossa, which is bounded in front by the Anterior Lacrymal Crest of the Maxilla, and behind by more sharply defined Posterior Lacrymal Crest of the Lacrymal bone. The periosteum not only lines the Lacrymal Fossa but is reflected over the contained Sac from one Crest to the other, thus completely enclosing it in a membranous *loge*; this is separated from the Sac by connective tissue containing a venous plexus, and is perforated by the Lacrymal Canaliculi. This periosteal covering, easily demonstrable by dissection, is not usually figured or described in accounts of the anatomy of the region, although sometimes referred to as the “deep or lacrimal fascia,” but it will be understood that it is a membrane which intervenes between the Lacrymal Sac proper and the structures in relation to it; in this article the term “Sac” is applied to the Lacrymal Sac so enclosed. It is the ossification of part of this membrane which accentuates the sharpness and overlap of the Posterior Lacrymal Crest, and determines the various degrees of development of the Hamular Process—that projection of the lower part of this Crest which skirts the margin of the Naso-lacrymal Canal.

(2) The *Ligamentum Palpebrarum Mediale* (*Internal Palpebral or Tarsal Ligament*, *Tendo Oculi Internus*) formed by extensions of the medial extremities of the Tarsal Plates of the eyelids, divides almost immediately into two limbs which pass across in front and behind the upper half of the Lacrymal Sac. The division which passes in front is known as the Anterior or Direct portion, that which passes behind is the Posterior or Reflected portion. The Anterior portion, to which alone the term “*Tendo Oculi*” is commonly applied, is much more strongly developed than the Posterior part, and is the well-marked band thrown into prominence beneath the skin at the inner angle of the eye by drawing the lids outwards. It is obliquely placed from above downwards, being closely connected to the Lacrymal Sac superiorly, where it is covered by fibres of the *Orbicularis Oculi* muscle, but separated from the Sac inferiorly by muscle fibres which pass deep to it, thus leaving the lower margin of the ligament free and conspicuous after removal of the skin. It is attached to the Anterior Lacrymal Crest

* Part of an address delivered at the Oxford Ophthalmological Congress, July, 1912.

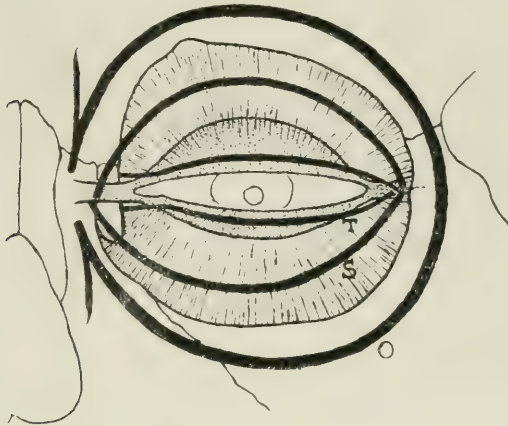


Fig. 1. Diagram to show direction and insertion of chief fibres of Orbicularis Oculi muscle.

o=*Pars Orbitalis* covering the orbital margin.

s=Preseptal portion of the *Pars Palpebralis*.

t=Pretarsal portion.

The Tarsal Plates have been dotted in, and the Anterior or Direct portion of the Ligamentum Palpebrarum Mediale is shown passing across in front of the Lacrymal Fossa, with the Tarsal fibres of the Orbicularis Oculi running to the Posterior Lacrymal Crest.

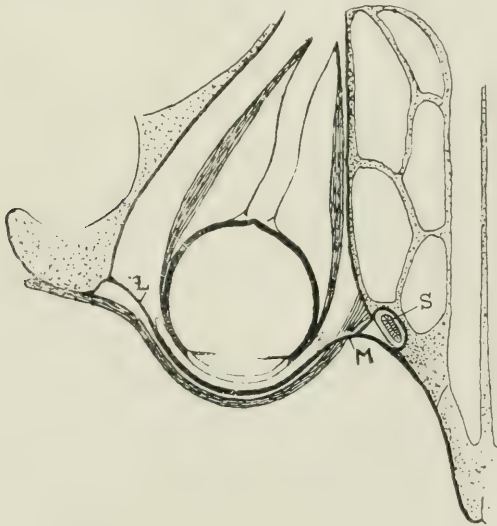


Fig. 2. Diagram of lower half of a horizontal section through right orbit, viewed from above and in front. Immediately in front of the globe is represented the Tarsal Plate, the extremities of which are continued into the Lateral (L) and Medial (M) Palpebral Ligaments. The latter divides into Anterior and Posterior portions which pass in front and behind the Lacrymal Sac (S) enclosed in its periosteal membrane. In front of the Tarsal Plate is a band of fibres of the Pretarsal portion of the Orbicularis Oculi muscle, which on the medial side is continued along with the Posterior portion of the Ligament behind the Lacrymal Sac where it forms part of Horner's muscle.

and also to a considerable extent of the smooth surface of the Ascending Process of the Maxilla in front of this ridge. The Posterior portion of the *Ligamentum Palpebrarum Mediale* which passes behind the Sac, is a much weaker and less easily isolated structure than the Anterior. It is adherent to the Lacrymal Sac and attached to the Posterior Lacrymal Crest. For the sake of brevity, these two portions of the Ligament will hereafter be referred to as the Anterior and Posterior Ligaments.

(3) The *Pars Palpebralis of the Orbicularis Oculi muscle*, that part which assists in the formation of the eyelids, may be subdivided into a *Pretarsal* portion overlying the Tarsal Plates and a *Preseptal* portion overlying the *Septum Orbitale*—the membrane extending from the Tarsi to the orbital margin (Fig. 1). These two portions are demarked from one another by the line of the superior and inferior palpebral folds, and have important differences in their relations and attachments at the inner angle of the eye. The *Preseptal* fibres support the orbital contents between the globe and orbital margin, and are inserted into the bone and Anterior Ligament in front of the Lacrymal Sac; on the other hand those fibres comprising the *Pretarsal* portion for the most part present quite different relations in this region and appear to have a more important function. They run parallel to the free margins of the lids and converge towards the Inner Canthus (Medial Commissure). Here, whilst the superficial fibres are inserted on to the Anterior Ligament and so obscure the path of the deeper lying fibres, the bulk of the fasciculi (those of the lower lid forming a specially robust bundle) pass behind the medial extremities of the Tarsal Plates and join together to form a thick muscular mass which passes behind the Lacrymal Sac together with, and lying upon, the Posterior Ligament. In this situation these fibres form the chief part of the so-called "Horner's Muscle" (*Tensor Tarsi*, *Posterior Lacrymal muscle*, *Pars Lacrymalis* of the *Orbicularis Oculi muscle*) but it must be realised that this name merely denotes the medial part of two continuous muscular bands which sweep across the lids from the lateral angle of the eye. Some few fibres of Horner's muscle are short and end upon the Tarsal Plates, others are closely related to the Lacrymal Canaliculi, but the great majority are direct continuations of the *Pars Palpebralis* of the *Orbicularis Oculi muscle* as described above, and can be traced right across the lids. The medial attachment of the fibres is to the subjacent Posterior Ligament, to the posterior Lacrymal Crest, and also to a wide area of the Lacrymal bone behind the latter. The importance and strength of this insertion is shown by the frequent presence in the skull of a thickening of the upper part of the Posterior Lacrymal Crest.

The most important structures, then, in relation to the Lacrymal Sac are the Anterior portion of the *Ligamentum Palpebrarum Mediale* which passes in front of it, and the *Pars Palpebralis* of the *Orbicularis Oculi muscle* which passes behind it as Horner's muscle. Both these structures are continued into the lower eyelid, and the direction in which they run from the lid relative to the Sac will be seen in a horizontal section of the orbit passing through the Medial Canthus and so dividing the tendon and muscle about their centres (Fig. 2). In the lower half of the preparation it will be noted that the muscle fibres which pass behind the Sac continue directly the arc formed by the free margin of the lower lid, and thus are well adapted for the function of maintaining the lid in close contact with the globe of the eye in its excursions and of keeping the *Punctum Lacrymale* directed inwards towards the *Lacus Lacrimalis*—a function they could exercise irrespective of any influence they may be considered to have upon the lumen of the Lacrymal Sac in effecting the draining away of the tears. It can easily be shown in the preparation

that Horner's muscle is made tense by any attempt to pull the lid away from the globe; but, on the other hand, the Anterior Ligament passes forward from the lid at such an angle in front of the Sac that hardly any traction is exercised upon it by such manipulation. To stretch the Ligament it is necessary to reverse the direction in which the lid is pulled, and it is not until the arc formed by the lid margin is flattened and the force directed outwards in a line passing from one Canthus to the other, that the Ligament becomes taut. This is what occurs in the living subject when the Ligament is made evident by drawing the eyelid outwards, and it will be found that the prominence of this structure is increased when more strain is placed upon it by pressing the globe backwards into the orbit at the same time that traction is made upon the lids. The further backwards the lids are pressed the tighter the Ligament becomes, exactly opposite to what was found in the case of the muscle.

Conclusion.

Thus it can be shown that removal of the Tendo Oculi Internus (Anterior portion of the Ligamentum Palpebrarum Mediale) from in front of the Lacrymal Sac should not affect the action of those fibres of the Orbicularis Oculi muscle which, sweeping round the free margins of the lids, are continued behind the Sac under the name of Horner's muscle, and whose chief function it appears to be to maintain the margins of the lids in close contact with the globe. From a study of the anatomical features of this region, therefore, the essential point in operations on the Lacrymal Sac as regards the after effects on the eyelids would appear to be the avoidance of injury to those muscle fibres of the lids which pass behind the Sac.

NOTE.—It may, perhaps, be added that under normal conditions in the *cadaver* it is quite easy to remove the Lacrymal Sac without interference with the Tendo Oculi. This is rendered feasible by the fact that the Ligament overlies the upper part only of the Sac, and, moreover, its lower margin is separated from the Sac by fibres of the Orbicularis Oculi muscle. If the Ligament be hooked up from below and these muscle fibres separated and retracted, the periosteal covering of the Sac is exposed. This may be opened and the Sac itself dragged down and forwards and cut away after severing the Canaliculi. Of course, under such conditions as necessitate removal of the Sac in life it may be more difficult to dissociate the structures in immediate relation to it.

CLINICAL MEMORANDA.

TREPHINING THE SCLEROTIC.

BY

ARCHIBALD STANLEY PERCIVAL, M.B., B.C., CAMB.,

SENIOR SURGEON TO THE NORTHUMBERLAND, DURHAM, AND NEWCASTLE EYE INFIRMARY.

Major Elliot's operation has not in my hands led to the brilliant results that have apparently been attained by others, so I ventured to adopt a new method some five weeks ago. No conclusion can be drawn from a single case, and it is too recent for any assertion of ultimate cure, but at the same

time the result is so hopeful that I feel it to be my duty to publish the case, in order to give my colleagues the advantage of this single experience.

On January 9th the patient presented herself at the Eye Infirmary, saying that her right eye had been blind for some time and that now her left eye was failing. Right eye, practically no anterior chamber T. + 2, no injection, V. reduced to shadows of large objects. Left eye T. + 1, V.=6/18, nasal field contracted.

I trephined the right sclerotic subconjunctivally between the inferior and external rectus, letting out a large quantity of vitreous. Two days afterwards, she told me that the sight was returning to her right eye. The improvement has continued, and on February 13th I found that her vision was 6/24, the site of the trephine hole marked by a small scarcely raised bleb, and T. normal. The other eye had responded well to pilocarpine: T. normal and V.=6/6 partly.

A FURTHER NOTE ON THE "SCLERECTOME."

BY

F. H. VERHOEFF, M.D.

BOSTON, U.S.A.

IN THE OPHTHALMOSCOPE of March, 1910, I described a new instrument for producing a subconjunctival fistula. Further experience with this instrument has confirmed its value, and has shown that if the sclerostomy is successful at the outset, the opening will remain patent indefinitely. For good results it is obvious that the instrument should be in perfect condition, and in this connection a few words of caution may be of service.

In the first place, it is important not to imitate the operation on pieces of paper, cloth, etc., for the cutting edge of the instrument is easily injured. Its sharpness should be ascertained by withdrawing the central rod and testing the cutting edge on a piece of soft chamois skin held over a cork. The button should fit snugly into the end of the trephine, so that when it enters, it meets with some resistance. If the cutting edge is found to be sharp and the button to fit thus snugly, the instrument will cut a clean hole in the sclera without twisting the eye. I have found that it is best to have the instrument re-sharpened after every three operations, and to have two instruments, so that one may always be ready for use.

The opening in this instrument was purposely made small, and in some cases in which the iris does not bulge into the scleral opening, this causes some difficulty in grasping the iris to make the button-hole. For this purpose a specially delicate iris forceps should be used. I have had a larger instrument constructed, and in a certain class of cases this may prove desirable.

In making the conjunctival flap, I have found, as has Elliot, that it is best not to carry the incision entirely to the limbus, and that the conjunctiva should be undermined as far on to the cornea as possible. This may be for a considerable distance if there is a *pannus degenerativus*, as is not infrequent. In addition to this, I have found that the best result is obtained when an extremely thin layer is dissected up. When a large amount of episcleral tissue is included in the flap, it greatly increases the tendency of the scleral opening to close.

Atropine should be used after the operation, especially in cases with only moderate tension, so as to enhance the bulging of the conjunctiva over the opening.

I am now inclined to believe that a sub-conjunctival fistula does not serve its purpose in the way that has been assumed, namely, by permitting drainage of aqueous beneath the conjunctiva and thence into the lymphatics or blood vessels. It seems probable to me that this happens only for a very short time, if at all, and that the permanent reduction of intra-ocular pressure is due to diffusion of the aqueous through the conjunctiva into the conjunctival sac. The fact alone that a cystoid elevation is formed over the scleral opening proves that egress into the surrounding tissues has been closed off.

NOVELTIES.

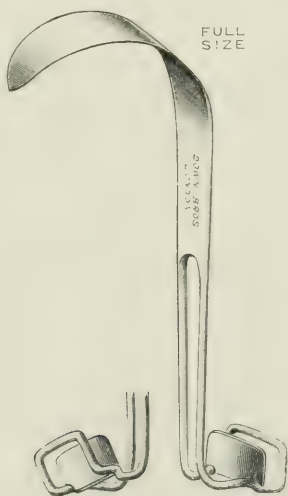
A NEW EYELID RETRACTOR.

BY

C. G. RUSS WOOD, F.R.C.S.,

SHREWSBURY, ENGLAND.

THE instrument illustrated has been devised to overcome some of the defects of the lid retractors now in use. The lower part of the shank is malleable, so that it can be adjusted to a prominent orbital margin, at the same time no pressure whatever is caused on the eyeball itself. The solid upper



blade presses the cilia out of the way of any instrument which is being used on the globe, and when in use, the shank rests on the forehead, so that only slight pressure from the bent finger is required to retain the elevated lid in its place. It has been most excellently made for me by Messrs. Down Bros., London, S.E.

TRANSLATIONS.

THE SENILE CHANGES FOUND IN THE HUMAN EYE.*

BY

DR. GUSTAVO ATTIAS.

MUNICH, BAVARIA.

The Cornea.

TWENTY years after Schön had suspected the presence of fat in the white discoloration called arcus senilis, Canton (1850) demonstrated by histo-chemical tests the innumerable fatty droplets in the cornea corresponding to the region of the arcus. From that time on, most authors have accepted fat as the cause of the coloration.

In spite of the fact that all recent examinations have shown the presence of fat in these cases, there is still to be found in some text-books evidence that the authors have been influenced by the opinion of Fuchs, in favour of hyaline degeneration, and by the findings of Leber, who traced calcium salts in the arcus.

Wishing to determine the truth, Attias has used modern chemical and histo-chemical methods to examine the nature of the droplets. The eyes investigated in this and other examinations, were fixed in various fluids, according to the researches which were to be made. Thus, for example, when wishing to investigate the presence of lime salts, he was careful to use fixing fluids which did not dissolve the salts.

When he had shown with certainty that neither hyaline substance nor lime salts were the possible cause of the opacity, he was able to prove, by a number of separate tests, that the substance reacts in all respects like fat.

Although the osmic acid test gave almost negative results, Attias found that, after fixation in formalin and treatment with Flemming's fluid, all the corpuscles, without exception, became coloured deep-black, a convincing proof of their fatty nature.

Further, he showed by the chemical method of Kumagawa and Suto, that corneæ with arcus contain about twice as much fat as normally clear corneæ. This method, as is well known, demonstrates the presence of fat, even in quantity quite invisible to the microscope.

"As regards the distribution of the fat," Attias goes on, "in the various parts of the cornea affected with arcus senilis, I have obtained the following results:—

Corneal Epithelium.—Fuchs, in a few cases of arcus, saw hyaline granules in the epithelium, but no other investigator has been able to find any such granules or droplets. By the action of osmic acid, according to the routine indicated above, or by the prolonged action of Sudan III, first on the material in mass and afterwards in section, or even by Nile blue sulphate, I have been able to demonstrate, in cases of marked opacity, very fine fat granules in the corneal epithelium. These granules are intercellular or perinuclear; absent from the superficial layers, they become visible in the middle strata, and more numerous in the deepest layers of the epithelium. They are specially marked in the region between the nuclei of the basal cells and the membrane of Bowman. They extend towards the centre of the cornea for a considerable distance, but are completely absent from the pupillary region. I have been able to demonstrate similar granules in the deeper layers of the conjunctiva near the cornea.

*Abridged translation from *La Clinica Oculistica*, July, 1912.

Bowman's Membrane.—Takayasu and Vollara examined the membrane of Bowman in the region of the arcus in sections deeply stained with Sudan III, and were unable, even with high powers, to distinguish separate granules in this membrane. The examination of antero-posterior sections gave me similar results as regards finding of granules, but when I investigated the parts that were less deeply stained, I recognised some very fine fat-droplets, arranged in sagittal rows and sometimes occupying the small canals in Bowman's membrane, through which the perforating nerve filaments pass.

But it was in sections cut tangentially, on the flat, that my examination of the separate droplets found in the membrane of Bowman in the region of the opacity was most facilitated. In fact, without these sections, it would not have been possible to demonstrate the innumerable droplets, which, arranged for the most part in file, often form, by running together, little threads or very elongated drops. While the fat is most abundant in the periphery, where the membrane of Bowman comes to an end, it diminishes gradually towards the centre, and is wanting entirely in the paracentral region of the cornea.

Parenchyma of the Cornea.—His and Virchow (1856), while speaking of the arcus, say that they have observed fat in the fixed cells of the cornea. Takayasu (1901) and Vollaro (1902) observed, further, in sagittal sections, droplets arranged in regular rows, in the lamellæ and in the intercellular spaces. Classen (1858), and Fuchs (1905) deny the existence of fat in the fixed cells. The first-named saw fat only between the lamellæ.

It is seen from this *résumé* that it is especially with regard to the distribution of fat in the parenchyma that authorities differ.

In the incipient stages of the arcus, the parts affected are the most superficial and the deepest layers; the middle strata are, as a rule, the last to take on the deposition of fat.

We can see in the less opaque parts of the cornea, in sagittal sections, one or two rows of fatty droplets running within the lamellæ of the cornea, parallel to their long sides, and as we pass towards the more dense opacity, we see the rows become three or more, until the droplets fill the corneal fibres.

In sections cut parallel to the surface of the cornea, one may see that the droplets are arranged in straight lines, which may be parallel, but more commonly cross one another in all directions. I have observed that the drops at the end of a row are the smallest, and that often the drops of a row are united by a thin thread of fat, so as to resemble beads on a rosary.

For the examination of the fixed cells, sections cut on the flat were specially useful, and I was able to see that the droplets had for the most part a perinuclear arrangement, and were numerous, but without definite order, in the processes of the fixed cells. In the spots of dense opacity, if the enormous number of droplets in the fibres does not hide the fixed cells, as often happens, one can assure oneself that the nuclei, which here contain fat, are broken-up or evacuated. The mobile cells, also, contain fat in their protoplasm, and show vacuoles in their nuclei.

Both on the central and on the peripheral side of the dense zone, the droplets in the lamellæ and fixed cells diminish in number, but from no part of the periphery are they entirely absent; in the centre no fat can be found.

In those cases in which a pinguecula has attacked the superficial layers of the sclera and reached to the cornea, I have noted an unusually large quantity of fat in the neighbouring parts of the sclera and cornea up to the arcus.

The greater the development of the arcus, the greater the destruction of the superficial lamellæ of the cornea in the periphery just beneath the corneal epithelium. This is always most marked in the upper segment, where the arcus is specially prominent.

In the place of the substantia propria of the cornea, we find a connective tissue rich in vessels, and often containing a large number of granular cells, although it is not possible to discover any focus of inflammation or of local irritation due to any cause.

On the anterior surface of the membrane of Descemet are seen large fat drops, for the most part flattened out and extending in abundance from a point a little central to the canal of Schlemm, almost to the pupillary zone of the cornea.

Descemet's Membrane and the Endothelium.—In typical cases of arcus senilis, the membrane of Descemet takes a red stain, but it is not possible, even with high magnification, to distinguish any fat droplets therein. In those cases in which the deeper parts of the cornea were much involved, I could make out with certainty the presence of droplets disposed in rows crossing one another. I was able in some cases to see fat droplets in the protoplasm of the cells of the endothelium.

In a recent communication Vollarò alludes to his having found, in the eyes of aged people, fat in the anterior part of the sclera, while the equatorial region generally escapes. In this region Vollarò has noted granular deposits of calcareous concretions, which are more numerous as one goes back, while the fat deposits also re-appear amongst the scleral fibres. In some cases, according to Vollarò, the calcareous infiltration becomes intense. The arteries present an abundant infiltration of droplets and granules of fat, both in their adventitia and in the interstices of their walls.

Takayasu, in 1901, discovered in eyes with arcus senilis, fat in the deep anterior layers of the sclera, as noted in 1865 by Stellwag v. Carion.

As regards the distribution of fat in the sclera, in the majority of cases, I found that the fibres contained less fat as I went further back. I met with calcareous salts in some cases, but never in any quantity in otherwise normal eyes. As regards the vessels, my researches gave results so entirely in agreement with Vollarò, that I shall not waste time in relating them.

The Iris.

Senile changes of the iris may affect the pupillary margin, the endothelium the constrictor muscle, the posterior pigment layer, or the vessels.

Fuchs, in 1885, called attention to the changes in the pupillary margin. He observed that in some eyes, the tissue in the region of the pupil had taken on a hyaline appearance for which he could find no cause, and therefore supposed to be a senile change. All the cases examined by him were in persons of advanced years. Meller (1904) described four cases of hyaline degeneration of the margin of the pupil, and Axenfeld, at the last Heidelberg Congress, referred to some cases of the same nature.

It is not rare in old people to see that the pupillary margin of the iris, instead of appearing black from the presence of the pigment layer, has, in whole or part, a grey colour, lighter than that of the remainder of the iris. In such cases we find that the pupil reaction is sluggish or entirely wanting. We can see, however, in some cases anatomical changes of the pupil margin, although the eye presents no microscopic abnormalities whatever. Seen by the microscope, the alterations may be summed up as follows: partial or complete disappearance of the pigment layer at the pupillary margin of the iris, transformation of the tissue at the margin, and behind the sphincter, into a hyaline mass, poor in nuclei and vessels, which latter are badly delimited from the surrounding tissue, on account of the similarity of appearance between their walls and the other tissues. This tissue of hyaline appearance, in which we can recognise the remains of the pigment layer, sometimes sends processes

between the fibres of the constrictor muscle. Besides these changes of the pupillary margin, one may meet in old people with a change of the endothelium, in some places, into a membrane without structure. The constrictor muscle, except in those cases which present extreme degeneration of the pupil margin, shows no noteworthy alteration. At the most, we see an increase of connective tissue between the muscular fibres.

The altered vessels present the picture of sclerosis of their walls, but one cannot recognise fat or lime salts in them.

In the pigment layer covering the posterior surface of the iris, I have been able to recognise in some senile eyes, true epithelial excrescences, with vacuolation, more or less marked, of the protoplasm of the cells.

The Ciliary Body.

In the *ciliary body* we must distinguish the ciliary muscle, the tissue between this and the ciliary processes, and, lastly, the processes themselves. The ciliary muscle, is, in old age, the seat of changes in the fibres themselves, and in the interfibrillar connective tissue. As regards the fibres, we note that they are, in the majority of cases, thinner than in young subjects. In some places we may speak of a true atrophy of the fibres. Treated with reagents to show fat, they are slightly discoloured, but even with high powers, it is not always possible to recognise the individual droplets of fat. However, I find that the total quantity of fat which they contain is considerably increased, but not sufficiently to allow us to demonstrate it under the form of drops.

In a few senile eyes, normal to every other test, I succeeded in demonstrating after prolonged action by Sudan III, minute drops of fat in the large majority of the muscular fibres of the ciliary muscle. In these cases one could even find fibres coloured red by the Sudan III, in which single drops could not be demonstrated. A similar condition may be met with in parts of the retina and choroid.

Stellwag v. Carion, fifty years ago, showed the presence of fat in the fibres of the ciliary muscle, and recently Vollaro confirmed this fact, which according to the latter, "may perhaps have an important bearing on the development of presbyopia."

The interfibrillar tissue is always present in greater amount in old eyes, and often takes on a hyaline appearance. In this we frequently find fatty droplets, and even pigment containing fat.

The Ciliary Processes.

The *ciliary processes*, as is well known, are especially developed in age and hypermetropia, and present more protuberances than in youth. But, on the other hand, seen from the inner surface, they appear less pigmented. In the central layers of the stroma of the protuberances, and in the subepithelial layers, we may observe, after adolescence, a progressive diminution of the connective tissue cells, and an increase of the connective tissue. In some old eyes the increase of the connective tissue at the expense of the cells is such that all trace of these cells may be absent in successive fields of the microscope.

The new connective tissue is more compact, and with advance of years, assumes a hyaline aspect.

The arrangement of the new connective tissue in the ciliary protuberances is in concentric layers, like an onion, and it contains few vessels and those for the most part sclerosed, with thick walls poor in nuclei, and lumen so constricted as barely to allow passage to a blood corpuscle. The adventitia

especially shares in the hyaline change, and can with difficulty be distinguished from the surrounding tissue. The endothelium has few nuclei. Some vessels have the lumen practically obliterated; others, but these are rare, seem to be dilated, and may be considered as taking on the duties of the former.

The amount of fat in the vessel-walls is for the most part proportional to the amount contained in the surrounding tissue.

Senile changes in the vessels of the ciliary processes have been remarked by Kerschbaumer, and even earlier by Stellwag v. Carion (1865), who found them associated with fatty infiltration of the ciliary processes. Vollaro has recently observed the coincidence of these two findings. The deposition of the fat granules usually varies directly with the alterations of the tissues which have just been described. I have found further, that the larger and flatter protuberances are more attacked than the longer and thinner. The large protuberances are often full of fat granules, especially in the central parts. In the thin, it is in the peripheral regions that we find the fat.

In the stroma of the ciliary processes we can make out the fact, which I recorded above in speaking of the ciliary muscle—that is, the coloration of certain points by the reagents for fat, without the presence of individual fat droplets being recognisable.

In old people I have found the pigmented layer, which covers the internal surface of the ciliary body, made up of cells whose size is much more variable than in youth. I have been able to recognise the presence of fat-droplets in their protoplasm (especially near the basement membrane), but not with any constancy. Vollaro observed fat-droplets in the pigmented epithelium, arranged for the most part round the nuclei. I must mention here, the interesting excrescences of the superficial layer, which we occasionally meet with in old people, due to a multiplication of pre-existing cells. They have the form of small mounds, made by 3-5 irregular layers of cubical cells, or else are spherical, in which case they may take on a large size. The cells in the centre of these spheres are vacuolised and necrosed.

The tissue between the ciliary muscle and the ciliary processes, both from the microscopical and microchemical side, is the part least affected by senile change.

The Lens.

Gerontoxon Lentis.—Beer in 1817 spoke of an annular peripheral opacity of the lens, which he compared with the arcus senilis of the cornea. He made, however, no suggestion as to the cause or nature of this opacity. Schön (1831) examined this opacity anatomically, and came (with Ammon) to the conclusion that it affected the posterior capsule near the equator and occasionally the neighbouring part of the lens proper. This opinion was not shared by Walther (1845).

Becker (1882-1883) explained the origin of gerontoxon lentis as follows: as a result of the shrinking of the senile nucleus, and the tension of the zonule, the cortical layers tend to separate, to take up fluid from the surrounding lymph, and to soften.

Vollaro (and also Toufesco) observed in two cases of incipient cataract, small heaps of fat granules in the striæ, and also in a position "corresponding to the equatorial ring of opacity," which he seems to consider a gerontoxon.

Up to the present, there seems to have been neither a microscopical nor a microchemical examination of a case of pure gerontoxon lentis, where, that is to say, there has been an annular circumscribed zone of opacity in the equatorial region, without the punctiform or radiating striæ which

characterize incipient cataract. I give here, therefore, the results which I have obtained from the study of typical cases:

Let me say, first of all, that one can see, even with the microscope, no opacities in the perfectly transparent zone which surrounds the gerontoxon peripherally. The capsule of the lens was in all cases normal, nor was I ever able to detect any alteration or the presence of deposits of fat in the zonule. The epithelium is almost always normal; only in a few sections could I detect in the spaces between the cells, very fine fat droplets, arranged in a halo.

If we stain the sections with van Gieson, we shall see the fibres near the equator stained red, while the more centrally situated fibres remain colourless or stain faintly yellow. This fuchsinophile zone is, at the equator, about five times the thickness of the capsule, and thins out as it passes towards the poles of the lens. Except for this increased affinity for fuchsin, the peripheral fibres show no change in their condition. In a few sections only, one can see droplets of fat in clefts of these fibres, which run parallel to their sides. The changes which give rise to the opacity in question are found in the deep part of the fuchsinophile zone near the equator; these changes affect the nuclei as much as the fibres themselves. The nuclei lose, first of all, the faculty of staining with nuclear stains, they then present in their interior, vacuoles, and by degrees more vacuoles surround the nuclei, gradually shutting each off from the fibre in which it is found. These peripheral vacuoles increase in size and fuse together, so as to form a large space in the fibre in which the nucleus lies, slowly disintegrating. Finally, there is left a large cavity, often from twenty to thirty times as large as the pre-existing nucleus, in which one can see numerous drops of fat. I have never been able to see drops of fat in the nucleus itself.

Besides these vacuoles, we can find many others in the other parts of the fibres, but having no relation in position to the nucleus. These vacuoles, lying near to each other in the same fibre, and fusing to some extent one with the other, come to form figures like the so-called "seaweed figures," which are usually met with in ordinary cataract. In the interior of these vacuoles, and especially along the walls, we see very fine but numerous drops of fat.

The External Muscles of the Eye.

In cases of advanced arcus senilis Canton found fat in the external muscles. Later, Virchow, Strube, and Arnold repeated the observation. But none of these authors goes into any detail, but gives this bare fact without further elucidation.

The age at which these alterations come on is very variable. I will give here an account of the findings which I have met with in my microscopical examination of this condition:

Both in transverse and in longitudinal sections, one readily notes an increase of intramuscular connective tissue, especially in the neighbourhood of the larger vessels. This increase is confined to the spaces between the fibres, the interfibrillar connective tissue is not augmented.

The presence of fat can be observed in greater quantity in the tissue near the large vessels; these, especially the arteries, have their walls thickened and their lumen contracted, and contain some droplets of fat in their walls, while the cells of the endothelium appear unusually rich in fat. In the tissue between the fibres, fat drops are found in small number only.

In transverse section we may note that in old people the fibres lose the polygonal section of youth and become somewhat rounded. This, I think,

is to be attributed to the fact that the increase of connective tissue between the fibres lessens the mutual pressure between them. Another change of age is that we see more fibres of unusual size, either small or large, than in youth. The sarcolemma is very visible in transverse section, on account of its increased thickness, and in some places appears opaque. The sarcoplasm, both that part immediately under the sarcolemma, and that between the fibrils, is increased in volume, especially in the region of the nucleus, the increase is such that the sarcoplasm may be seen forming a kind of ring round the fibre at the level of the nucleus. The longitudinal striation is easily visible in certain fibres, at the expense of the transverse, so that in some points the transverse striation is absolutely invisible. The nuclei, which lie under the sarcolemma, are not always a very elongated oval, as in youth, but are often rounded or irregular. They are, also, more variable in size, and more numerous than in the young.

Although the following finding is not common, yet it seems worthy of note, namely, that the fibres of the external ocular muscles may sometimes show ruptures or transverse interruptions, especially in the neighbourhood of their insertion into the globe. Every segment contains, as a rule, a nucleus of altered shape, often having the long axis transverse.

Even within the fibres themselves of the external muscles, it is possible to see fat in abundance. This especially shows itself in the form of three or four corpuscles near the poles of the nucleus; in later stages, one sees it gradually spread round the nucleus and in the peripheral and interfibrillar sarcoplasm. The fat is particularly abundant where the sarcoplasm is augmented in volume. In the fibres mentioned above as transversely divided, the corpuscles of fat are often in considerable number.

The Nerves of the Anterior Segment of the Eye.

I shall deal here with the senile changes in the nerves of the anterior segment of the eye—a point which seems hitherto to have escaped any mention by authors. These alterations may be allied to some which I have met with in isolated fibres of the same nerves, even in the normal eyes of young people. They may, therefore, be called physiological degeneration of the anterior nerves of the eyeball.

That absolutely normal peripheral nerves may contain degenerated fibres is a fact fully demonstrated by various authors (Schiff, Luschka, Kuhnt, Mayer, and others). Such altered fibres are very rare in the eyes of the young, but are abundant in the eyes of the old, especially in regions that have been attacked by fatty degeneration. The changes are most evident at the limbus, but can be followed in the nerves which penetrate the cornea even up to the pupillary region.

This senile physiological degeneration attacks chiefly the myelin sheath of the nerves; the axis cylinder and the external sheath are the last to be attacked. I shall not delay to describe minutely the changes of the myelin sheath of the circumcorneal nerves, because they differ little from the changes due to pathological processes or to section. We may often see myelinated fibres shaped like a rosary, containing fat drops. Sometimes, we may observe fatty droplets in the swellings of the myelin sheath so large that they fill these swellings completely. Thinned points of the myelin sheath correspond to the level of the nucleus of the sheath of Schwann, which nucleus appears so much enlarged that one may attribute to it, in part, the thinning of the neighbouring myelin sheath. We may also meet with myelinated fibres here and there broken up into fragments, and their place taken by large drops of

fat, between which it is difficult to make out a vestige of the axis cylinder, which often stains badly with carmine and appears broken at certain points.

Besides the enlargement of the nuclei of the sheath of Schwann, already mentioned, we may see also at the poles of the elongated nuclei very fine fat droplets, which increase in number at the limbus and in the vicinity of the arcus.

Between the fibres of the corneal nerves, both superficial and deep, one sees in the old, a great multitude of fat drops, which are especially numerous where the nerve filaments traverse the region of the arcus. But even centrally from the arcus, the nerves still contain drops of fat; these, however, diminish as we approach the centre of the cornea. In more than a few cases I could follow these fat droplets into the central regions of the cornea, even in the perforating filaments of the nerves in their course through the membrane of Bowman and in the corneal epithelium."

HAROLD GRIMSDALE.

12.—GUIDE TO THE MICROSCOPIC EXAMINATION OF THE EYE.

(Continued)

BY

PROFESSOR R. GREEFF,

DIRECTOR OF THE UNIVERSITY OPHTHALMIC CLINIQUE IN THE ROYAL CHARITY HOSPITAL, BERLIN,
WITH THE CO-OPERATION OF

PROFESSOR STOCK
(FREIBURG)

AND

PROFESSOR WINTERSTEINER
(VIENNA)

TRANSLATED FROM THE THIRD GERMAN EDITION,

BY

HUGH WALKER, M.A., M.B., C.M.,

OPHTHALMIC SURGEON TO THE VICTORIA INFIRMARY, GLASGOW.

Retina.

The human retina is a perfectly transparent membrane about $\frac{1}{3}$ mm. in thickness. It is very instructive to cut into a fresh eye and to allow some vitreous to escape; the retina is then found detached and floating freely in the vitreous. It has, therefore, no substantial connection with the tissues behind, and is kept applied to the choroid only by the normal tension of the vitreous. In its fully developed condition the pigment epithelium is firmly adherent to the choroid and has no attachment to the retina proper. From a developmental point of view, however, the pigment epithelium belongs to the retina.

The retina is firmly united with the choroid at two places only: first, at the papilla; and, secondly, around the ora serrata. This connection is evident not only in a fresh eye which has been opened, but also in pathological conditions, exudations, etc.

Boll discovered, in 1876, that during life the retina possessed a purplish-red tint, and that this was due to colouring-matter contained in the outer

segments of the rods. The pigment at once becomes pale when exposed to daylight. Hence it is seldom seen in eyes removed from the dead body.

Visual Purple.—This is very evident in fishes, like the bream, which possess a white chalky tapetum. If the fish is kept in the dark for some time before being killed, and the eye is then removed and divided along its equator, the retina appears as a rose-red membrane, which soon becomes pale and cloudy in daylight. The colour is maintained longer if the posterior half of the eyeball is at once transferred to a weak solution of formalin. In other animals with dark choroids the reddish tinge is less apparent.

Macula Lutea.—Further, the area corresponding to the highest acuity of vision and its neighbourhood (*macula lutea*) present a yellow appearance due to a pigment which is diffused through all the layers of the retina. This colour persists for a considerable time after death.

This is best demonstrated in an eye removed from the dead body. The bulb is divided along the equator, and the portion of retina around the papilla removed and placed on a slide under a cover-glass. Even with the naked eye, and still more clearly under a low power of the microscope, the Fovea Centralis is recognisable as a bright depression, devoid of blood vessels and surrounded by an intensely yellow ring.

Coloured Globules are found in the retinae of many birds and reptiles. They lie at the junction between the outer and inner segments of the cones, lending to the retina the appearance of a delicate variegated mosaic. To obtain a view of these, a fresh piece of retina should be removed from the eye of a pigeon or fowl, transferred to a slide, and examined under a high power.

CROSS-SECTIONS OF THE RETINA.

The eye is hardened *in toto* in warm alcohol, sublimate, Flemming's fluid, formalin, or Müller's fluid. It is then laid open, and a small portion of the retina, a few millimetres in diameter, is removed and imbedded in paraffin. Celloidin sections are too thick. Staining with hæmatoxylin-eosin.

Three rows of nuclei are seen clearly in a section so prepared. The outermost row, the *outer nuclear layer*, contains six or seven layers of nuclei; the intermediate row, the *inner nuclear layer*, is only about half as thick; the innermost row, the *layer of ganglion cells*, contains throughout the greater part of the retina only a single layer of nuclei. These three rows of nuclei correspond to three layers of nerve cells (Neurons), the relationship between which has been established by the researches of Ramón y Cajal.

The following layers can be distinguished in a cross-section of the retina :—

- I. Pigment epithelium.
- II. Layers of rods and cones.
- III. Membrana limitans externa.
- IV. Outer nuclear layer.
- V. Outer plexiform layer.
- VI. Inner nuclear layer.
- VII. Inner plexiform layer.
- VIII. Layer of ganglion cells.
- IX. Layer of nerve fibres.
- X. Membrana limitans interna.

I. PIGMENT EPITHELIUM.

This is a single layer of polygonal, usually hexagonal, cells, which, when viewed from the surface, appear as a delicate mosaic. (For the method of demonstrating these see above.) The elements are separated from each other

by a delicate layer of colourless cement substance (Neurokeratin). The individual cells are best studied in teased preparations, which have been hardened in 1 per cent. osmic acid. Each cell consists of an outer non-pigmented zone, a basal zone, and processes. The outer zone contains the oval nucleus. With an oil immersion lens, the pigment present in the basal zone and processes can be recognised in the form of minute crystalline rods. In the human retina the processes are short; in that of the frog and the bird they are very long. When the retina of a frog, which has been kept in the light for some time before being killed, is examined, the processes are found to be full of pigment particles, and extended so as to surround the rods and cones and almost to reach the external limiting membrane. On the other hand, when the frog has been kept in the dark, the processes and pigment crystals are found to be retracted towards the basal zone.

2. LAYER OF RODS AND CONES.

This layer exhibits many variations in the different vertebrata, and lends to each retina its characteristic appearance. The rods and cones are not complete cells. Each is prolonged through the *limitans externa* to become connected with one of the nuclei of the outer nuclear layer, and ends finally, the rod as a small knob, the cone as a flat dendron, in the outer plexiform layer. They are easily isolated.

The rods and cones are too closely packed together in sections to admit of their being seen in their entirety. Moreover, they often become distorted in the hardening process.

When Weigert's stain for the medullary sheaths is employed, and differentiation is not carried too far, the inner segments of numerous rods and cones will be found to be coloured and to stand out clearly.

Isolation of the Visual Cells.

The retinal elements can be isolated in several ways.

1. *Fresh Preparations.*—The eye is removed from the animal immediately after death, and divided along the equator. A small portion of the transparent retina is excised and teased on a slide in a drop of vitreous fluid. The tissue is protected by a cover-glass rested on small pieces of wax or on a paper ring surrounding the piece of retina. The various elements, rods, cones, etc., are then found to be isolated. In optical cross section the former appear as small, the latter as larger, circles.

2. The best method for completely isolating the visual cells is the *Osmic Acid Method* introduced by *M. Schultze*. A small eye, *e.g.*, a frog's, is excised and placed at once in a 1 per cent. solution of osmic acid for 12-24 hours. Thereafter it is macerated for 1-2 days in several changes of distilled water. A larger eye, *e.g.*, a human eye, should be divided along the equator; the posterior hemisphere is treated in the osmic acid, and is then macerated for at least two days. Only absolutely fresh material can be employed. Small pieces of the retina are removed by means of forceps and placed on a slide in a drop of glycerine. If permanent preparations are desired the cover-glass must be cemented (See "Mounting in Glycerine"). Examination under a high power shows the various retinal elements isolated. Complete visual cells may be seen. The remainder of the hardened retina may be stored, and will keep well for years in the solution recommended by Merkel (von Graefe's *Archiv*, Bd. XX). The solution consists of equal parts of absolute alcohol, glycerine, and water.

3. G. Stort and Engelmann employ the method suggested by Altmann.

The bulb is hardened in a 3.35 per cent. solution of nitric acid for six hours, washed for a short time in running water, and then divided through the equator. Small pieces of the retina are placed on a slide in a minute quantity of water or diluted glycerine, so that they adhere to the glass, and are hacked with a sharp razor. (Altmann, *Archiv für Anatomie und Physiologie*, S. 219, 1881; Genderen Stort, von Graefe's *Archiv für Ophthalmologie*, Bd. XXXIII, Heft iii, S. 230.

3. MEMBRANA LIMITANS EXTERNA.

In cross sections of the retina the external limiting membrane appears as a sharp line, separating the layer of rods and cones from the outer nuclear layer. Specimens treated with iodised serum (tincture of iodine 1, pericardial or amniotic fluid 100) or by Golgi's method show that the membrane is formed by the apposition of the outer ends of the sustentacular fibres of Müller. The membrane is fenestrated, the round apertures corresponding to the rods and cones. The surface view has, therefore, the appearance of a grating. The larger apertures correspond to the cones, the smaller to the rods.

4. OUTER NUCLEAR LAYER.

The outer nuclei vary very considerably in size in different animals, being largest in amphibians and reptiles, and very small, on the other hand, in fishes and mammals. They are the nuclei of the visual cells. The peculiar arrangement of the chromatin in these nuclei, different in different animals, produces the ribbed appearance which they often present in the human retina. This is best demonstrated by hardening in Flemming's solution and staining with safranin. It can, however, be seen in sections stained with hæmatoxylin (oil-immersion lens).

5. OUTER PLEXIFORM LAYER.

This was formerly called the outer molecular layer, since in cross-sections of the retina it has a finely granular appearance. The granules are transverse sections of fibrils which here form a dense reticulum. This altered conception of the anatomical structure is due to the application of Golgi's method in the examination of the retina. The outer plexiform layer contains the endings of the visual cells and the rich arborisations of the bipolar cells of the next layer.

6. INNER NUCLEAR LAYER.

Three sets of cells can be distinguished in this layer. Most externally situated is the layer of "horizontal" cells. These are particularly well seen in cross-sections of the retina of the fish, when stained with hæmatoxylin. Next to these is the large mass of nuclei belonging to the "bipolar" cells. The bipolar cells are spindle-shaped, one process passing into the outer plexiform layer, the other into the inner plexiform layer. They serve to connect the visual cells with the large ganglion cells of Layer VIII. The innermost nuclei belong to the flattened branched cells, called "spongioblasts" by W. Müller, and "amacrine cells" by Ramón y Cajal.

7. INNER PLEXIFORM LAYER.

This resembles the outer plexiform layer. It consists of a dense reticulum of fibrils derived from the cells in the adjacent layers. In birds it presents horizontal markings, due to plexuses lying one over the other.

8. LAYER OF GANGLION CELLS.

This consists of a single layer of cells unless in the region of the macula lutea, where there are several layers. The presence, then, of more than one stratum of ganglion cells is an indication that the section belongs to the neighbourhood of the macula.

The morphology of the ganglion cells and their branched processes is demonstrated most clearly by Golgi's method. Surface views of the retina prepared by Ehrlich's process are also of astonishing beauty. The finer structure of the ganglion cells in their normal state as well as in pathological conditions is of great interest, and should be investigated by means of Nissl's stain or one of its modifications.

The ganglion cells are separated from one another by the fibres of Müller and by small oval neuroglia cells.

9. LAYER OF NERVE FIBRES.

The distribution of the nerve fibres in this layer has been investigated very fully by Michel in surface preparations hardened in Müller's fluid (*Ueber die Ausstrahlungsweise der Opticusfasern in der menschlichen Retina*. Wiesbaden, J. F. Bergmann, 1875). The structure of the individual fibres can also be clearly distinguished in pieces of the retina treated with methylen blue. The axis-cylinder consists of fine fibrillæ united by a small amount of interfibrillar substance. (Dogiel, "Ueber die nervösen Elemente in der Netzhaut des Menschen," *Archiv für mikrosk. Anatomie*, Bd. XXXVIII.)

10. MEMBRANA LIMITANS INTERNA.

This is formed by the expanded bases of Müller's supporting fibres.

There are still certain portions of the retina which possess histological peculiarities, and so call for further examination. These are the *ora serrata* and the *macula lutea*.

Ora Serrata.

The retina does not cease at the ora serrata, but becomes somewhat suddenly reduced to a single layer of cylindrical epithelial cells, which are prolonged forward over the orbiculus and ciliary processes, and, becoming flatter, cover the posterior surface of the iris. At the margin of the pupil this layer of cells, representing the retina proper, is reflected to become continuous with the prolongation forward of the pigment epithelium. These two layers form the *Pars Ciliaris* and *Pars Iridica Retinæ*.

Macula Lutea.

The macula lies about 4 mm. to the temporal side of the optic papilla and a little distance below the horizontal meridian. It is usually elliptical in shape, with its longer axis placed horizontally. The yellow colour of the macula and the thickening of the ganglion cell layer in its vicinity have already been referred to. In the centre of the macula the retina is greatly thinned, all the layers, with exception of that formed by the visual cells, being absent or very much reduced. In this way a depression with sloping sides is formed—the *Fovea Centralis*.

The structural relations of the various retinal elements are best displayed by means of Golgi's method. The retina is extremely difficult to handle, but the beauty of a successful preparation repays the trouble expended. The tissue must be fresh. The eye of a large animal should be selected. Cajal's roll

method followed by double impregnation, etc. If several rolls are taken and exposed to the reagents for different periods, some are likely to be successful.

Comparative Anatomy.

The structure of the retina is surprisingly uniform in all vertebrates. The layers are always the same unless in the Petromyzon and in a few members with rudimentary eyes. The main differences are found in the form and number of the rods and cones, due to the peculiarity of each animal's vision.

The retina of the mammal resembles most closely that of the fish, the only difference being that in the latter there are fewer elements, and, as a consequence, a simpler structure. In birds and amphibians the retina is distinguished by having the outer nuclear layer thinner than the inner. The opposite is usually the case.

(To be concluded.)

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—PATHOLOGY.

(First Notice.)

-
- (1) Hudson, A. C.—Injury to the vitreous body as a factor in the production of secondary glaucoma. *Royal London Ophthalmic Hospital Reports*, Vol. XVIII, Part 2, September, 1911.
 - (2) Lazareff.—The autocytoxic theory of senile cataract viewed in the light of experimental criticism. (La théorie autocytotoxique de la cataracte sénile devant la critique expérimentale.) *Ann. d'Oculistique*, novembre, 1911.
 - (3) Galloway, A. Rudolf.—Notes on the pigmentation of the human iris. *Biometrika*, January, 1912.
 - (4) Browning, S. H.—The value of the "direct smear" in the bacteriology of conjunctivitis, with analysis of a thousand cases. *Ophthalmic Review*, April, 1912.
 - (5) Löhlein, W.—Anophthalmos with palpebral cysts. (Anophthalmos mit Palpebralcyste.) *Zeitschrift für Augenheilkunde*, Mai, 1912.
 - (6) Pickler, A.—Report upon another autopsy upon a case showing traumatic enophthalmos. (Bericht ueber eine weitere Obduktion beim Enophthalmos traumaticus.) *Zeitschrift für Augenheilkunde*, Juni, 1912.
 - (7) Tooke, Frederick.—Calcareous degeneration of the cornea and lens capsule. *Trans. Amer. Ophth. Society*, Vol. XIII, Part 1, 1912, p. 3.
 - (8) Jakobs, M. W.—A clinical and microscopical contribution to the subject of solitary tubercle of the papilla. (Klinischer und mikroskopischer Beitrag zur Solitärtuberkulose der Papilla nervi optici.) *Klin. Monatsbl. f. Augenheilkunde*, Juli, 1912.

- (9) **Salus, Robert.**—Extracellular action of the leucocytes in the vitreous. (Ueber extrazelluläre Leukozytenwirkung im Glaskörper.) *Klin. Monatsbl. f. Augenheilkunde*, Juli, 1912.
- (10) **van Lint, A., and Steinhaus, J. (Brussels.)**—Xanthelasma of the eyelids causing by subcutaneous proliferation, a bilateral xanthelasmic tumour of the anterior part of the temporal regions. (Xanthelasma des paupières, ayant amené, par prolifération sous-cutanée, un xanthome bilatéral en tumeur, de la partie antérieure de la région temporale.) *Ann. d'Oculistique*, juillet, 1912.
- (11) **Takayasu, M.**—On primary fatty degeneration of the cornea. (Ueber eine primäre Fettdegeneration der Cornea.) von Graefe's *Archiv f. Ophthalmologie*, Bd. LXXXII, S. 31, August 13th, 1912.
- (12) **Ogawa, K.**—Cavernous degeneration of the optic nerve. (Ueber die Kavernöse Degeneration des Sehnerven.) *Archiv f. Augenheilkunde*, Bd. LXXII, Heft 1, S. 10.
- (13) **Byers, W. Gordon M.**—Microscopic findings in the eyeball of a man who died from an untoward cause seven weeks after the extraction of a senile cataract. *Trans. Amer. Ophth. Society*, Vol XIII, Part 1, 1912, p. 81.

(1) This paper is based on the examination of eyes affected by secondary glaucoma, following backward dislocation of the lens, subluxation, and dissection of capsular membrane.

Hudson, of London, finds that complete backward dislocation may cause increased tension in several ways: (1) the passage of the vitreous forward into the anterior chamber obstructs the exits of the angle and the iridic crypts; (2) the direct pressure forwards of the vitreous on the iris closes the angle; (3) the pressure forwards of the iris is increased by the ballooning of the vitreous through the pupil, preventing free communication between the anterior and posterior chambers; and (4) the vitreous in the anterior chamber forms a scaffolding for the growth of endothelium and the deposit of impervious hyaline membrane in the spaces of the ligamentum pectinatum.

Subluxation gives rise to glaucoma by pressure forward of the root of the iris, thus closing the iridic angle, the iris and sclera ultimately becoming adherent. In some cases the hernia of the vitreous between the iris and dislocated lens undoubtedly assists in the forward movement of the iris.

Glaucoma following dissection of after-cataract may result from iridocyclitis, but in most cases is probably due to injury to the vitreous. In those eyes with deep anterior chambers the vitreous comes forward through the pupil and obstructs the excretory channel, whilst in others, where dissection has been very free, the vitreous presses forward the iris, thus narrowing the angle, and comes through the pupil, and by overlapping the border prevents free communication between the anterior and posterior chambers.

In some remarks on treatment, **Hudson** suggests the advisability of dividing any but the most delicate membranes with a **Ziegler's** knife, inserted very obliquely, and cutting gently forwards.

A. H. PAYAN DAWNAY.

(2) **Lazareff**, of Toula, has carried out a series of experiments with a view to testing the correctness of the theory put forward by **Römer**, **Golovine**, and **Frenkel**, viz., that senile cataract is caused by specific autocytotoxines. The results lead him to form the following conclusions.—1. That experiments *in vivo* and *in vitro*, carried out under strictly scientific conditions, have failed to establish the presence of amboceptors specific for the lens in the

serum of immunised rabbits or in the serum of humans, whether suffering from cataract or free from it. 2. That the explanation of senile cataract may be found in the loss of albumin which the lens suffers in advanced life, when the capsule, altered in its chemical and physical structure, allows substances to pass through it to which it should nominally bar the way. R. J. COULTER.

(3) This article by **Galloway**, of Aberdeen, on the pigmentation of the iris, does not lend itself to independent abstraction, but the author's conclusions may be transcribed :

1. The human iris cannot be held to consist merely of an anterior and a posterior surface, each, in certain eyes, exhibiting its own kind of pigment.

2. The stroma may contain pigment cells, more specially in its deeper parts, and granular pigment towards the anterior surface.

3. Pure blue, or so-called "simplex" eyes, which to any outward examination appear free from anterior pigmentation, may show stroma pigment cells and anterior granular pigmentation when examined microscopically.

4. Hence the classification of "duplex" and "simplex" eyes is erroneous, and there is no discontinuity or Mendelian inheritance between them.

ERNEST THOMSON.

(4) **Browning**, of London, finds it most useful to examine two films in each case, one stained by carbol methylene blue, and the other by Gram's method, although a presumptive diagnosis can often be satisfactorily made without the latter. He gives tables showing the results of confirmation by culture.

A. H. PAYAN DAWNAY.

(5) **Löhlein**, of Greifswald, in a paper which is commendably short, describes a case of congenital anophthalmos associated with cysts in the lids. An examination of the cysts showed that they represented the parts of a rudimentary eye, even including retinal elements. The paper discusses Natanson's theories, and refers the reader to Seafelder's book "*Die Angeborenen Anomalien und Missbildungen des Auges*" for further information regarding these cases. Coloured drawings of the sections are attached to the communication.

T. HARRISON BUTLER.

(6) **Pickler**, of Klagenfurt, gives the result of an autopsy upon a case of traumatic enophthalmos dead of cancer of the œsophagus. The examination showed a large defect in the outer wall of the orbit and some shrinking of the orbital fat.

T. HARRISON BUTLER.

(7) **Tooke**, of Montreal, noted a dense, circular, yellowish-grey cicatrix, covering the pupillary area of the cornea in an eye blinded by glaucoma. The eye was fixed in formalin, frozen, and bisected, in doing which the lens escaped from the zonule. On trying to cut the lens across, it cracked unevenly, like an egg-shell. Particles of this covering, treated with dilute sulphuric acid, liberated carbonic dioxid, proving that it consisted of true calcium carbonate. Sections of the cornea showed hyalin degeneration beneath Bowman's membrane, and large, irregular, amorphous masses, which cut with a definite sensation of resistance and grittiness, lay about Bowman's membrane and in the areas of hyaline change. A few of the deposits were situated above Bowman's membrane, where they displaced the epithelium from the hyalin tissue.

SYDNEY STEPHENSON.

(8) The case reported by **Jakobs**, of Freiburg, was a lad of 17 years. On the right side there was tuberculosis of the lacrymal sac, but the eye itself was normal, and the vision 6/6. On the left side there was tuberculosis of the conjunctiva and purulent dacryocystitis. Vision was equal to fingers at two or three metres, and there was a large central scotoma, surrounding and continuous with the blind spot. Ophthalmoscopic examination showed a very extensive and prominent nodular greyish mass in front of the disc. Some

improvement seemed to follow treatment with injections of bacillary emulsion, but six months later, the condition was found to be worse, the vitreous was opaque, and an acute iritis having supervened, the eye was enucleated.

In sections, the eye showed a tuberculous mass in front of the disc, breaking through into the optic nerve and its sheaths. There was also at one point tubercle of the iris and ciliary body, and some involvement of the choroid in the neighbourhood of the papilla.

The author believes that his was a case of primary solitary tubercle of the nerve-head. The presence of small isolated tubercles in the optic nerve just in front of the point of division, lends support to the view that when tubercle affects the disc or its immediate neighbourhood expectant treatment is not justified. Enucleation should be performed early, and the largest possible piece of the optic nerve removed along with the globe. It has been proved, both clinically and by *post-mortem* examination, that this eye lesion may be the only tuberculous focus in the body. The prognosis as regards life is therefore a good one if the eye be removed. Where this has been postponed, a fatal result has occurred from involvement of the meninges through the optic nerve and its sheaths. There is all the less inducement to take risks in such cases since vision is usually very gravely affected.

A further point of interest in Jakobs' case is that the conjunctival tuberculosis was cured by treatment with lactic acid.

A. J. BALLANTYNE.

(9) In some recent work, published in von Graefe's *Archiv*, F. Deutschmann declared that he had seen diplococci, present in eyes which had excited sympathetic inflammation, undergo transformation in culture into sarcinæ, and these sarcinæ revert to the form of diplococci, after passage through the abdomen of the guinea-pig or the eye of the rabbit. On this he based the conclusion that after a perforating injury of the eye, sarcinæ may gain entrance, may change into diplococci, and in this form may leave the eye, and travel to the other eye by the lymph spaces round the optic nerve, and there set up sympathetic inflammation.

Salus has been unable to confirm Deutschmann's results. He found no evidence of the conversion of sarcinæ into cocci, and he casts doubts on the correctness of Deutschmann's bacteriological *technique*. In the course of the investigations carried out to elucidate this point, Salus made the interesting observation which is the subject of this paper.—After inoculating the vitreous with sarcinæ, an examination of the exudate showed sarcinæ in all stages of degeneration. This degeneration is shown to be due to bactericidal substances secreted by the leucocytes attracted to the neighbourhood. There was no phagocytosis. To this extracellular action of the leucocytes, he proposes to apply the term "Aphagocidia."

A. J. BALLANTYNE.

(10) **van Lint's** patient, a woman, aged 50 years, had the lids of both her eyes almost completely covered with typical xanthomata, and, in addition, had tumours in the temporal regions, immediately behind the orbital margin, that on the right side being the size of a pigeon's egg, while that on the left was as big as a hazel nut. Careful examination of the patient showed that all her organs were perfectly healthy, and, in particular, that there was no trace of organic or functional disease of the liver. No diabetes.

The tumour on the right side was removed, and given to **Steinhaus**, of Brussels, for pathological examination. At the operation it was found to be well localised but not capsulated, as hard as a fibroma, and of the yellow colour characteristic of xanthoma. There was no adhesion to the skin, but yellow tracts spread from its inner side to the deep layers of the skin of the xanthomatous upper lid, while externally it appeared to spread and to invade the temporal aponeurosis, and its limit was not reached

at the operation. The histological structure of the greater part of the tumour was that of a fibroma with collagenous fibres, arranged in tolerably regular bundles, the cells of which had in places a fairly voluminous protoplasm, containing drops of lipid substance and an oval nucleus. These cells formed sheaths round the vessels, which were at times of considerable thickness, and in parts of the tumour were collected into masses, so that there were considerable areas in which no fibres could be seen, but only cells usually mono- but sometimes bi- or poly-nuclear, full of drops of lipid substance, and at times reaching enormous sizes. The cellular contents of the tumour stained bright-red with Sudan III, and grey or blackish (but never deep black, like the fat cells of the surrounding subcutaneous tissue) with Flemming's stain. Under a polarising microscope, they were anisotropic. Steinhaus considers that, in addition to cellular infiltration, there was undoubted formation of new tissue in the tumour, and that this was neither inflammatory nor hyperplastic, but neoplastic. In support of this view, he quotes the appearances which he has found in sections of ordinary xanthoma of the eyelids. These consist of collagenous fibrils between masses of fairly big cells, with oval nuclei, containing a fine chromatic network and a central nucleus, and having abundant deeply-staining protoplasm. A considerable number of these show mitotic changes. Passing towards the centre of the *plaques* the cellular masses get larger and closer to each other, until, finally, they become confluent, and at the same time the cells become bigger and more and more charged with lipid masses, while the mitotic figures become rarer, and finally disappear. In some parts of the xanthomatous tissue the collagenous fibres increase with the cells, but in others they disappear altogether. Masses of elongated or polygonal cells, sometimes pigmented but often unpigmented, are found at the periphery of these *plaques*, below the epidermis and separated from it by a layer of normal tissue.

The subject of xanthoma is of interest, in view of the discovery by Pincus and Pick, in 1908, that the substance which had been previously regarded as fat is anisotropic and the further observation that this substance is of a lipid nature, and that while there are only traces of cholesterine found in normal skin, it is present in large quantities in xanthoma, where it is due to the decomposition of an ether of cholesterine and a fatty acid. From the fact that in 50 per cent. of the cases of xanthoma, a connection can be established between it and diabetes, or diseases of the liver, accompanied by icterus, and that ether of cholesterine and fatty acids are present in the blood of patients suffering from diabetes and icterus, Pick concluded that the xanthoma of diabetes and icterus are infiltrations of the cells, with lipoids from the blood, and that idiopathic xanthoma is probably of a similar nature, *i.e.*, local infiltration in lipid substances in pre-existing connective tissue, endothelial, or lymphoid cells. He admits, however, the existence of true neoplasms of xanthomatous character. Steinhaus, while admitting the facts with regard to the lipid nature of the anisotropic substance of the xanthoma cells, contends that in his sections of xanthoma, the absence of all the characteristics of infiltration cells in the lipid cells and the polygonal cells from which they are derived, together with the resemblance between the latter and the fixed cells of the tissue, makes it impossible to attribute the cellular masses to infiltration, while the mitotic figure in the fixed cells of both the ordinary xanthoma and the tumour, prove that they are the source of the xanthomatous cells, which, in his opinion, must be neoplastic. R. J. COULTER.

(11) Secondary fatty degeneration of the cornea is fairly common as a complication of keratitis, scleritis, and uveitis, but as a primary disease it is very rare, if we exclude arcus senilis and border atrophy. One case of this

kind has been described by Tertsch, and **Takayasu** (Kanagawa, Japan) now publishes two new ones. Both were suffering from trachoma, but Takayasu does not think there is any causal connection. The fat globules were mostly localised in the lamellæ and within the corneal cells. Bowman's membrane was also affected, but the epithelial layers were free. R. GRUBER.

(12) Cavernous degeneration of the optic nerve in glaucomatous eyes has been reported by Deutschmann, Birnbacher, and Zermat, also by Schnabel and Elschmig. The two latter believed the degeneration to be the cause of the glaucomatous cupping. Schnaudigal found similar changes in hæmorrhagic glaucoma, and believed they were due to hæmorrhages which had been pushed together by the optic nerve septa. Axenfeld discovered similar changes in an eye with a high degree of myopia, and thought the change a degenerative one.

Ogawa's specimen was obtained from a healthy woman of 59 years, who five years previously had noticed a small crust-covered node on the left upper lid. In five years the tumour had so increased as to hide the globe completely, with swelling of the preauricular and submaxillary glands. An extirpation operation was performed by Professor Sakata. The specimen was hardened in alcohol, embedded in celloidin, and sections were stained by different methods, including Benda's—1-2 hours in Delafield's hæmatoxylin without differentiation. In the sections of the optic nerve, behind the lamina cribrosa, the lower half of the nerve was pale and remarkably transparent. The sheaths were normal. The intervaginal space and lamina cribrosa showed no changes. The disc was slightly cupped. In the ganglion cell layer of the retina, no ganglion cells were found. There was degeneration of the layers, with increase of the neuroglia. The layer of rods and cones, and the inner molecular layer, were retained. In the periphery of the retina one saw the well-known peripheral cystoid degeneration. The pigment layer of the retina was intact, while the choroid was highly degenerated. The pale coloured and peculiarly transparent part of the optic nerve cut through a cavernous or gap-like system, which seemed to have arisen through atrophy of the nerve fibres and interruption of the septa. This was best seen in the sections stained by van Gieson. The preparations stained by Benda's method, even with the low power, gave a very different picture, in that it was barely possible to find the sinuses. The spaces were here filled with a fine fibrinous exudation, "weaving," and in these areas were found large isolated irregular faintly stained cells. The protoplasmic continuation of the cells appeared to take part in the construction of these areas. The walls of the sinuses were covered with cells and fibrinous exudation. The whole reminded one of the picture in Krückmann's work on "Pigmentation and Development of the Retinal Neuroglia." There was no extravasation of blood, and no blood elements were found in the sinuses or vicinity. In other parts of the optic nerve one saw cell multiplication as in ordinary atrophy, and also many round empty spaces without any wall covering. Ogawa thought these the advance guards of the sinuses.

A short synopsis of the cases reported by Schnaudigal and Axenfeld is given, and the historical aspect of the subject repeated in detail. Schnabel and Elschmig found the nerve fibre mass in the ocular end of the optic nerve destroyed. The destroyed material was absorbed, which left a system of sinuses between the connective tissue strands under the lamina cribrosa. When the connective tissue walls came together and shrunk, there originated an empty space. In this way originates glaucomatous cupping, which may occur without any increased tension.

Most writers will not concede the truth of Schnabel's theory.

Watanabe examined two specimens, under Schmidt-Rimpler's direction, and pointed out that glaucomatous cupping was not always accompanied by cavernous appearances. Schnaudigel found cavernous cupping in a case of hæmorrhagic glaucoma. He believed that apoplectic insulation of the optic nerve, caused through breaking-down of the mass, had, after re-absorption of the blood elements and nerve substance, formed a cyst, and that the exudation represented the attempt at repair by the neuroglia. Axenfeld, from the examination of his case, thought it very improbable that the hæmorrhage was the cause of the cupping. The position and dilatation of the cavernous degeneration was related in some measure to the amount of the peripapillary degeneration of the choroid and retina, which was ascending. His case showed that lacunæ and complete atrophy could be found under the lamina without being followed by cupping, and could also be found in eyes with no signs of glaucoma. Ogawa's was similar to Axenfeld's, but he did not make out that the degeneration was an ascending one. He does not offer any explanation as to how the change has taken place. Although Schnaudigel suggested that this astonishing form of atrophy could be attributed to hæmorrhage which had destroyed the septa, Ogawa could not find a trace of hæmorrhage, or any disturbance in the connective tissue as generally observed in optic nerve atrophy, or any hypertrophy of the pial sheaths. On the contrary, the interruption of the septa was very clear. Ogawa looks upon it as a very curious degeneration. The attempt of the neuroglia at repair corresponds to the action of the connective tissue in the kidney, liver, and heart.

The article is illustrated with micro-photographs and two coloured plates.

HANFORD MCKEE.

(13) **Byers's** patient, from whom a cataract had been removed about five weeks previously, committed suicide by throwing himself from a high window. One eye, secured for pathological examination, showed much the changes that might have been anticipated.—Anteriorly, the wound was united by a quadrilateral mass of epithelial cells, and four-fifths of the wound was sealed by newly-formed connective tissue. A large tag of the anterior capsule of the lens was incorporated with the posterior part of the corneal section. Both sides of the hinder edges of the wound (not yet healed) were covered with large masses of endothelium. Spaces of Fontana and Schlemm's canal crowded with leucocytes. Substance of iris but slightly infiltrated, and, in particular, there were no perivascular foci of infiltration in iris or ciliary body.

SYDNEY STEPHENSON.

II.—OCULAR SYMPTOMS IN INTRACRANIAL SURGERY.

Sachs, E.—The importance of ocular symptoms in intracranial surgery. *American Journal of Ophthalmology*, December, 1912.

The communication by **Sachs**, of St. Louis, is an article by a cerebral surgeon addressed to ophthalmologists, and seems to preach the creed of no delay where there are eye symptoms which may point to the possibility of a brain lesion.

The article is divided into two parts, the first dealing with the general ocular symptoms of intracranial pressure, the second with localising symptoms. Papilloedema associated with increased intracranial tension is always a pressure phenomenon. Optic neuritis, regarded as an inflammatory process distinct from papilloedema, cannot in many cases be distinguished from the

latter. The distinctions drawn by Wilbrand are vague and uncertain. The most important distinction is that in choked disc only the nerve head is affected by the swelling, while in optic neuritis the retina is also involved. Yet conditions, such as meningitis of septic or tuberculous origin, and cerebral syphilis, may give rise to true optic neuritis *plus* increased pressure, and consequently choked disc. The author considers that in every case presenting the picture of choked disc, along with some other evidence of intracranial pressure, the retinal picture is due to pressure and not to inflammation, regardless of the amount of swelling. Albuminuric retinitis may be excluded by careful physical examination. In order to obtain the best results, the only safe time to operate for the relief of choked disc is at the earliest possible moment. It is not the amount of swelling that matters, but the duration of the process. Inversion or interlacing of the colour fields, described by Cushing and Bordley, is a very important symptom. It may be present before the development of choked disc, although the author has himself never seen it apart from the latter. The symptom may be absent, as may choked disc itself, but it occurs in a large percentage of cases of increased intracranial pressure. The author regards cerebral syphilis, whether occurring as a gumma or as a diffuse process, as no different from a tumour as regards increased intracranial tension. These cases of choked disc due to syphilis are relieved by a decompression operation, and this operation should be considered in cases in which the sight is failing in spite of the administration of specific treatment. With regard to the difficult question of the value for localizing purposes of the presence on one side or the other of a greater intensity of choked disc, Sachs points out that, in reality, the great question is the respective age of the process on the two sides. It seems from the available data that the more anteriorly in the cranial cavity a tumour is situated, the more frequently does the homolateral eye show a more advanced choked disc. With tumours in the posterior fossa unilateral swelling is of little localizing value, and the frequency of an associated internal hydrocephalus, which may distend one ventricle more than the other, makes this even more uncertain. Among the ocular localizing symptoms the most important are the ocular nerve palsies. The sixth nerve is often affected transitorily, and this is to be regarded as a general pressure symptom rather than a localizing one. Although rarely of localizing value, it should always raise the suspicion of intracranial complication. In one case known to the author, transitory sixth nerve paralysis appeared twelve months before the onset of the other symptoms of cerebral tumour. Nystagmus, as evidence of possible cerebellar disease, is always a symptom of importance. Anæsthesia of one cornea is one of the earliest symptoms of disease in the cerebello-pontile angle. The localising value of conjugate deviation of the eyes and of the various forms of hemianopia are then discussed. Another interesting form of visual field involvement has been observed in temporal lobe lesions. A portion of the visual fibres, those supplying the upper-outer sector of the field, take a very circuitous course in the temporal lobe, and careful perimetric charts every 15 degrees will demonstrate this sector, which is not apparent when the fields are taken at 30 or 40 degree intervals. Lastly, there is the symptom described by F. Kennedy, namely, the occurrence of central scotomata without any ophthalmoscopic change, due to a tumour or abscess in the frontal lobe pressing directly on the optic nerve. In Kennedy's cases the tumour pressed directly on the nerve and constricted the sheath, so preventing any cerebro-spinal fluid from being forced into it, and consequently preventing the production of choked disc.

ERNEST THOMSON.

III.—THE PATHOLOGY AND TREATMENT OF BUPHTHALMOS.

Stimmel, F. and Rotter, F.—Contributions to the pathology and therapy of congenital hydrophthalmos. (Beiträge zur Pathologie und Therapie des Hydrophthalmus congenitus.) *Zeitschrift für Augenheilkunde*, August-September, 1912.

Stimmel and Rotter, of Leipzig, contribute a joint paper upon buphtalmos, the former being responsible for the clinical part, and the latter for the pathological anatomy. The contribution is really a continuation of a paper by Seefelder, who made a study of the clinical and pathological material regarding buphtalmos gathered from the records of the Leipzig University Eye Clinic extending over a period of five years. Three cases are described in detail. In the first case there were several anomalies of development. For example, the canal of Schlemm was entirely absent; the ciliary muscle had a foetal structure; and there was an abnormal development of the iris and ciliary body. Acquired defects were: rupture of Descemet's membrane, hæmorrhages into the retina and choroid, detached retina, old thrombosis of the central vein and recent thrombosis of the inferior vorticosae veins. The other two cases showed extreme distention of the whole eyeball, especially of the anterior section, due to stretching; absence of the canal of Schlemm; rupture and thickening of Descemet's membrane; chronic irido-cyclitis and slight atrophic excavation of the optic disc.

The consensus of opinion is that the disease is caused by an absence, entire or partial, of the canal of Schlemm, which is placed abnormally far back; in the persistence of temporary foetal connective tissue in the angle of the anterior chamber, the so-called "ligamentum pectinatum" of the earlier authors, which Virchow calls "uveal scaffold-tissue," and, finally, in an insufficient separation of iris and cornea. The authors' cases support these views, and clearly demonstrate the fact that the essential factor is the absence of the canal of Schlemm. One of the cases showed that the iridectomy which had been performed had not freed the filtration angle, and yet it had for some time been successful. The authors think the reason was that the incision was a large one, and a filtering scar had formed. They suggest that a successful iridectomy for glaucoma might act in a similar manner, but hesitate definitely to pronounce upon this subject. The case shows, in their opinion, that the effect of a successful iridectomy does not depend absolutely upon freeing the angle from the root of the iris.

T. HARRISON BUTLER.

IV.—THE PATHOGENESIS OF GLAUCOMA.

(1) Fricker, Emil.—A contribution to the pathogenesis of glaucoma. (Beitrag zur Pathogenese des Glaukoms.) *Klin. Monatsbl. f. Augenheilkunde*, Juni, 1912.

(2) Gilbert, W.—Contributions to the theory of glaucoma. (1) Pathology, Pathogenesis, and Therapy. [Beiträge zur Lehre vom Glaucom. (1) Pathologie, Pathogenese, und Therapie.] von Graefe's *Archiv f. Ophthalmologie*, Bd. LXXII, Heft 3, August 13, 1912.

(1) The conclusion reached by Fricker, of Rapperswil, may be stated in his own words.—The diseases of the cardio-vascular and renal systems,

with elevation of the blood pressure as an accompaniment, stand, without doubt, in a genetic relation to glaucoma, and must not be looked upon as accidental complications. A similar significance attaches to pronounced respiratory obstruction, such as is found in emphysema.

On this ground he advises careful investigation of the blood pressure in glaucoma cases, and treatment directed to the correction of abnormal tension, such as venæsection, regulation of diet, and mode of living.

A. J. BALLANTYNE.

(2) Improved methods of determining the intra-ocular tension have established the fact that there is always some increase in glaucoma simplex. It is scarcely possible to say what is the minimum pressure under which inflammatory symptoms appear, or to use Elschnig's term, "when the condition of natural compensation is disturbed." It depends to a certain extent on local circulation, on the general blood pressure, and also on the anatomical formation of the eyeball. Heerfordt thinks that the point of demarcation is 55 mm. Generally speaking, this is fairly correct; the minimum pressure in glaucoma simplex may be accepted with Meller at 30 mm.-35 mm. Inflammatory glaucoma is much more frequent in hyperopia and perhaps in younger people, while compensated (simple) glaucoma develops more commonly in the non- or slightly hyperopic and in aged individuals.

Gilbert, of Munich, thinks that this increase of tension is due to disturbance of circulation leading to increase of blood pressure, which in connection with local arteriosclerosis and vasomotor fluctuations, causes a rise in the capillary pressure, venous stasis, and increased transudation. It is therefore natural that he advocates venæsection as a regulating agent. He gives three indications for its performance: 1, in the prodromal stage; 2, in glaucoma simplex when no operation is advisable, or if after operation the glaucomatous condition has not been cured (in this event blood should be let once or twice yearly); 3, before operation (6-24 hours before in glaucoma simplex, 12-36 hours in inflammatory glaucoma). General and dietetic regulations are also essential in the treatment of glaucoma—for example, avoidance of much meat, coffee, alcohol, and spiced dishes, also of hot and cold baths, the correct temperature being 93°-99° F.

In comparing the action of venæsection and myotics, it is seen that the latter have a more marked action on the tension, but their effect passes off much quicker and is generally gone when the action of venæsection is most marked; myotics should therefore be given $\frac{1}{2}$ -1 hour before operation. If venæsection does not lower the tension, the chances of an operation are also very small.

With regard to the several operations for glaucoma, Gilbert is in favour of iridectomy in the prodromal stage and in acute glaucoma. The case is different in glaucoma simplex where iridectomy, as well as all more modern substitutes, meets with many failures and some disasters. It is most noteworthy that most of these apply to cases where the tension was well lowered after operation. Gilbert thinks it is a mistake to attempt restoration of normal pressure in glaucoma simplex as the most desirable aim: in these cases a kind of compensation has been established, the disturbance of which may mean as much danger as the administration of digitalis in compensated valvular disease. This may be due to rapid progress of the cavernous degeneration in the optic nerve after sudden lowering of the pressure. As these cases are by no means rare (about 15 per cent.), Gilbert thinks that cases of advanced glaucoma simplex, with narrowing of the visual field to 20° on the nasal side, should either not be operated on at all, or at least with every precaution not to lower the tension too suddenly or too much. This

danger is even present in the application of myotics, especially of pilocarpine and dionine in substance, combined according to the directions given by v. Arlt, which is otherwise very effective. R. GRUBER.

V.—TONOMETRY.

- (1) Grönholm, V.—Researches on the influence which the size of the pupil, the accommodation, and the convergence have upon the tension of glaucomatous and normal eyes. *Archives of Ophthalmology*, November, 1911.
- (2) Toczyski, Franz.—The results obtained by the investigation of normal and glaucomatous eyes by means of Schiötz's tonometer. (Ueber die an normalen und glaukomatösen Augen mit Schiötzem Tonometer gewonnenen Untersuchungsergebnisse.) *Klin. Monatsbl. f. Augenheilkunde*, Juni, 1912.
- (3) Gunnufsen, Ths.—Clinical and statistical investigations of *Ulcus serpens corneæ* with special reference to the intra-ocular pressure. (Klinisches und Statistisches über *Ulcus serpens corneæ* mit besonderer Berücksichtigung des intraokularen Drucks.) *Klin. Monatsbl. f. Augenheilkunde*, Juni, 1912.
- (4) Gradle, Harry S.—Tonometry: with a description of a tonometer. *Ophthalmic Record*, September, 1912.
- (5) Luedde, W. H.—Usefulness of the Schiötz tonometer. *American Journal of Ophthalmology*, October, 1912.

(1) Grönholm has studied the tension of the eye on the following material: a case with prodromal symptoms of glaucoma, one with beginning glaucoma, one with an acute inflammatory glaucoma, cases with glaucoma simplex, and, finally, 35 normal eyes, one of which had diminished reaction of the pupils. Seven normal eyes were examined with the tonometer before and after the use of atropine drops. The Schiötz instrument was used. The different results which were sometimes obtained differed from those of other authors, and Grönholm thinks may be due to the fact that he took them after prolonged exposure to the given influence, *e.g.*, darkness, never less than an half-an-hour, and often much longer. Full reports are given of seven cases.

The conclusions he arrives at are as follows: "The tension rises during mydriasis, and decreases during myosis in glaucomatous eyes, and appreciably in normal eyes. An effort of accommodation reduces the tension in most glaucomatous eyes. Mydriasis may counteract the tension-reducing action of the accommodation. The tension does not vary in normal eyes when they accommodate; but during greater efforts of accommodation it seems to have the tendency to rise somewhat. The convergence does not produce any increase of tension measurable with Schiötz's tonometer. The changes in tension, which the eye undergoes during the activity of the ciliary muscle and the iris, are probably due to the opening of the filtration channels during the contraction of the pupils and during the accommodation, and to the narrowing of these channels during the relaxation of the accommodation and dilatation of pupils. The fluctuation of the tension is also produced by the increased circulation (in and out flow) of the ocular fluids (blood secretion) during the activity of the intra-ocular muscles and by the diminished circulation in the eye

during the period of rest. The same muscles, sphincter pupillæ and m. ciliaris, which provide for the increased blood supply and secretion in the eye, provide also for the increased outflow of these fluids from the eye in normal conditions. The glaucomatous eyes must be protected from darkness and long rest. Staying in light rooms and reading are to be strongly recommended as long as their pupils react well. After a glaucoma operation we have to instil myotics in the non-operated eye, and if we do not use a myotic, to avoid keeping the patient in a dark room or bandaging both eyes. In cases of suspicion of glaucoma with no increase of tension, we could test it after keeping the patient for a few hours in the dark, when we might find an increase of tension. A negative result does not exclude glaucoma. Pressure, massage, and pressure bandage of the eyes are followed by hypotony immediately after the cessation of the pressure. Lateral movements do not influence the degree of tension in any way." The effect of the changes in the pupil on the tension was strikingly shown in one case of tabes in which one eye did not react to light. This eye showed no change in tension either in the light or the dark, while the other eye with normal reaction of the pupil showed a constant variation in its tension following a light or dark test. The appearance of acute glaucoma after excitement is explained by the dilatation of the pupil usually accompanying such nerve storms.

ROSA FORD.

(2) After some preliminary remarks on the *technique* of tonometry, **Toczyski**, of Lemberg, gives the results of his own investigations of normal eyes, and of glaucomatous eyes before and after operation. He found the tension in normal eyes to vary between 12 mm. and 27 mm. of mercury. His statistics show a very slightly lower average tension in old age than in early life, but he did not find the pronounced fall given by Wegener, and thinks that age cannot be said to influence the normal tension. As a rule, he found the tension equal in the two eyes. Two of his glaucoma cases are of interest, as they had, with tensions respectively of 21 mm. and 25 mm., corneal œdema, dilatation of the pupil, ciliary injection, and other signs of inflammatory glaucoma. He assumes that in these cases the tension, although apparently within normal limits, was much above the normal for the individuals in question. As regards the results of operation, he found that in three out of twenty-two iridectomies, and in three out of four sclerotomies, the effect on tension was very unsatisfactory. The results were still more unsatisfactory in glaucoma simplex.

A. J. BALLANTYNE.

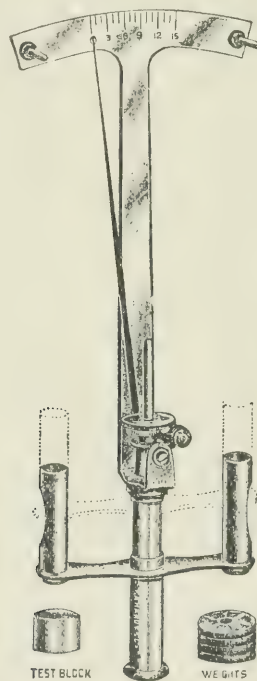
(3) **Gunnufsen**, of Christiania, investigating the material provided by Schiötz's clinic, finds that the number of cases of *ulcus serpens* is highest during the summer months. Plotting the numbers on a chart, a wave is seen commencing in May and ending in September, with its summit in July. The curve has the same character whether it deals with the yearly cases, or with the total cases for five years. He attributes the summer increase to the greater prevalence of work in the fields and woods. Out of 157 cases, 109 attributed the condition to accident, while 30 per cent. gave no history of injury. Only two out of the 157 patients claimed to have had a perfectly normal eye (free from watering, etc.) before the ulcer began, while 129 had actual disease of the tear-sac or a chronic catarrhal conjunctivitis.

The tension was measured in 101 cases, using the tonometer with a semilunar disc devised by Schiötz for cases with corneal deformity. There was elevated tension in 59. In all these cases atropine had been used in the treatment. A large number had a visible hypopyon. He attributes the rise of tension to choking of the filtration channels by products found in the anterior chamber, and, believing that the risk of secondary glaucoma is greater than that of posterior synechiæ, he advises that atropine be not used.

His treatment includes cautery, A_rNO_3 , argyrol, paracentesis (usually combined with iridectomy), and careful attention to the tear passages (extirpation of the sac, etc.).

A. J. BALLANTYNE.

(4) **Gradle**, of Chicago, finds mechanical defects in the Schiötz tonometer, and has made certain modifications, with a view to facilitate its use in practice. The footplate is 3 millimetres smaller than on the Schiötz instrument, allowing one to see the pupil while using the tonometer and to gauge accurately its position upon the cornea. The radius of curvature of the footplate is 7.6 millimetres (Schiötz's = 8.4), corresponding more nearly to the most recent estimates of that of the anterior surface of the cornea by Koster and Tscherning. The stylet has a diameter of 2 mm., as compared with 3 mm. of the Schiötz, and is fixed in the instrument and is not removable, thus avoiding the frequent mishap of its falling out of the instrument of its own accord. The



weights have all the same value, *viz.*, 1 grain each, and are merely dropped over the stylet which passes through a hole in the middle of the weight. The stylet and the pointer have a fixed mechanical relationship, and but little free play, so that once fixed at the zero, there is no necessity to bend the pointer. The instrument weighs less than the Schiötz, and is easier of manipulation. The underlying principles of the Schiötz's instrument have not been changed, and the readings with the two instruments are practically identical.

Gradle's tonometer is made by F. A. Hardy & Co., Chicago and New York.

J. JAMESON EVANS.

(5) **Luedde's** paper is composed of a series of careful clinical records with the Schiötz tonometer in various classes of case of increased and diminished tension.

ERNEST THOMSON.

VI.—OPERATIONS FOR GLAUCOMA.

- (1) Coppez, H.—Trephining the sclero-corneal limbus for staphylomatous leucoma adherens. (Trépanation du limbe scléro-cornéen pour leucome adhérent staphylomateux.) *Bull. de la Société Belge d'Ophthalm.*, No. 33, p. 29, 28 avril, 1912.
- (2) Wicherkiewicz.—Superficial crossed posterior sclerotomy. (La sclérotomie croisée postérieure superficielle.) *Ann. d'Oculistique*, juillet, 1912.
- (3) Gruening, E.—The operation of combined iridectomy and sclerectomy for chronic glaucoma. *Trans. Amer. Ophth. Society*, Vol. XIII, Part I, 1912, p. 84.
- (4) James, G. Brooksbank.—On a new method of operating in cases of glaucoma. *Transactions Ophthalmological Society U.K.*, Fasc. 3, 1912.
- (5) Fox, L. Webster.—The newer operations for glaucoma. *Ophthalmology*, October, 1912.
- (6) Hime, Major H. C. R.—Simple trephining for increase of intra-ocular tension. *Journ. Royal Army Medical Corps*, November, 1912.
- (7) Maklakow, A.—The method of obtaining a filtering cicatrix of the sclerotic. (Moyen d'obtenir une cicatrice filtrante de la sclérotique.) *La Clinique Ophthalmologique*, 10 novembre, 1912.
- (8) Lagrange, F.—The oblique sclerotomy of Professor Maklakoff and the filtering cicatrix. A reply to Professor A. Maklakoff of Moscow. (La sclérotomie oblique du Professor Maklakoff et la cicatrice filtrante.) *La Clinique Ophthalmologique*, 10 décembre, 1912.
- (9) Paton, Leslie.—Case showing a modification of Herbert's flap operation for chronic glaucoma. *Proceedings of the Royal Society of Medicine*, December, 1912.
- (10) von Mende, Roman.—The technique of Elliot's trephining operation. (Zur Technik der Elliotschen Trepanation.) *Klin. Monatsbl. f. Augenheilkunde*, Januar, 1913.
- (11) Schnaudigel, O.—The technique of trephining at the limbus. (Die Ausführung der Limbustrepanation.) *Klin. Monatsbl. f. Augenheilkunde*, Februar, 1913.
- (12) Smith, David Priestley.—Another glaucoma operation. *Ophthalmic Review*, March, 1913.

(1) H. Coppez, of Brussels, has successfully trephined, in accordance with Elliot's technique, eyes blinded by glaucoma, which would otherwise have had to be enucleated. He also describes the case of a staphylomatous eye, with raised tension, following blennorrhagic ophthalmia in a girl of 9½ years. The trephine was applied at the upper part of the corneal limbus, with the consequence that the staphyloma disappeared, and three months after operation, the intra-ocular tension was not far removed from normal.

It may be noted, in passing, that Colonel Elliot himself has trephined twenty-five eyes for staphyloma of the cornea, and speaks well of the operation under these circumstances (*Sclero-Corneal Trephining in the Operative Treatment of Glaucoma*, 1913, p. 36).

SYDNEY STEPHENSON.

(2) Wicherkiewicz, of Cracow, acting on the supposition that there are cases of glaucoma in which the hypertension is caused by excessive rigidity of

the sclerotic, has devised an operation to combat this condition by making a superficial grating (*grille*) in the thickest part of the sclerotic, in the hope of allowing it thereby to stretch. The operation is performed as follows.—After a sub-conjunctival injection of novocain and adrenalin, a speculum is inserted, and the eye being rotated downward, a meridional incision is made with a Graefe knife in the conjunctiva, sub-conjunctival tissues, and Tenon's capsule, as far back as possible over the upper and outer part of the eyeball, and the sclerotic is laid bare. Hæmorrhage is stopped with adrenalin, and the edges of the wound being retracted, a series of from four to six parallel incisions 10 to 12 mm. long, in a meridional direction, and several similar incisions at right angles to the first, are made in the sclerotic without penetrating it. In cases in which the tension is very high, one of the latter incisions may be made to penetrate the sclerotic for not more than 3 mm. or 4 mm., care being taken not to wound the choroid. After washing out the wound, it is closed with two or three sutures, which are removed in a few days. It is very important that the operation should be followed by daily massage of the eye for ten days, especially in cases in which the incision does not penetrate the sclerotic. The operation is not painful, and in over 100 cases the author has not seen any bad results. He gives *résumés* of 17 cases which he considers to have been carefully observed, but in the majority of these glaucoma was secondary. After four years' experience, he has formed the following conclusions.—1. Superficial crossed posterior sclerotomy is an operation which is not dangerous. 2. It is indicated in simple glaucoma, hæmorrhagic glaucoma, and every glaucoma in which operations on the anterior excretory passages have been performed with success. 3. It is possible that it will some day be the operation of choice in keratoglobus and keratoconus, which may be regarded as due to hypertension so slight as to be inappreciable by our present methods of diagnosis. 4. It is safe and efficacious in hydrophthalmos and in glaucoma secondary to dislocation of a lens into the vitreous, where all other interventions would be impossible..

R. J. COULTER.

(3) **Gruening**, of New York, has performed Lagrange's operation on twenty-two occasions during the last two years. He has every reason to be satisfied with the results he has obtained. He usually operates under general anæsthesia, and his *technique* differs somewhat from that of Lagrange. He prefers the operation to simple iridectomy for the following reasons.—(1) The wound heals more rapidly. (2) The anterior chamber is speedily restored. (3) The patient is not confined to bed for so long. (4) The results obtained by him are sufficiently favourable.

Discussion.

Reeve, of Toronto, voiced the advantages of Elliot's operation of trephining the sclera.

Holt, of Portland, described a modification he had made in Elliot's operation, in order to facilitate drainage.

Ziegler, of Philadelphia, did not think the Lagrange operation was so difficult to perform. He preferred the Herbert to the Elliot operation.

Lambert, of New York, found Gruening's modification very satisfactory, but he employed a Stevenson punch instead of scissors.

SYDNEY STEPHENSON.

(4) The operation described by **Brooksbank James**, of London, seems from the description to be a modification of the Lagrange operation. In James's operation, however, the sclera is sectioned from the outside instead of from the inside, and the scleral flap is everted, not actually removed. It is held in place

by the conjunctival flap, when this is replaced over the wound. The actual description of the method must be read in the original.

Up to the moment of writing, the author had operated on thirty-three cases of chronic primary glaucoma. Of these, twenty-seven were successful at a first attempt, as regards the filtering cicatrix and reduction of tension. In two cases of very acute primary glaucoma, vision was restored to normal by the operation. Details are given of four other eyes in acute glaucoma dealt with by this means. The author has been very pleased with his experience of the operation.

ERNEST THOMSON.

(5) The greater part of this paper, by **Webster Fox**, of Philadelphia, consists of a summary or review of the modern glaucoma operations, especially the various forms of sclerectomy and trephining. The author has made a slight modification of the "Fergus-Elliot" operation. Instead of dissecting up a conjunctival flap which remains attached along the corneal margin, he raises a flap which is detached from the upper part of the corneal margin. When this is afterwards stitched in position, it lies partly on the sclera and partly on the cornea, thus covering the wound like the flap in van Lint's cataract extraction. For trephining he uses von Hippel's instrument.

A. J. BALLANTYNE.

(6) A clear and full account of Elliot's operation for glaucoma addressed to the members of the Royal Army Medical Corps by **Major Hime**, himself an officer of the corps.

SYDNEY STEPHENSON.

(7) Under the above sufficiently modest title **A. Maklakow**, of Moscow, claims for his father, the late Prof. Maklakow, who died in 1895, priority in the matter of the filtering cicatrix. Up till now A. Maklakow had not been able to find in journals, other than Russian, his father's communication on the subject, and he decided not to speak. Now, however, he has at last discovered that his father's description of "sclerotomy obliqua" has been buried under the title "La Tonométrie" given to an article which appeared in the *Archives d'Ophthalmologie*, 1892, No. 5, pp. 321-350. On page 347 there is a figure of the sclero-corneal incision.

"Up to the present time," says the writer, "I have sometimes the chance of seeing patients operated on by my father by the method called *sclerotomy obliqua*, and I am able to state that each increase of tension causes ectasia of the cicatrix and a subconjunctival œdema in the neighbourhood of the cicatrix. Filtration is evidently wonderfully well performed. I trust that this short communication gives me the right to ask my colleagues to accord to Professor Maklakow's memory the merit of having been the first to perform an operation yielding the filtering cicatrix."

ERNEST THOMSON.

(8) It is hardly advisable to endeavour to abstract **Lagrange's** reply to the claim to priority in the matter of the filtering cicatrix which was made by Professor A. Maklakoff, on behalf of his late father, in the November, 1912, number of *La Clinique Ophthalmologique*. Those interested will be well advised to study the originals.

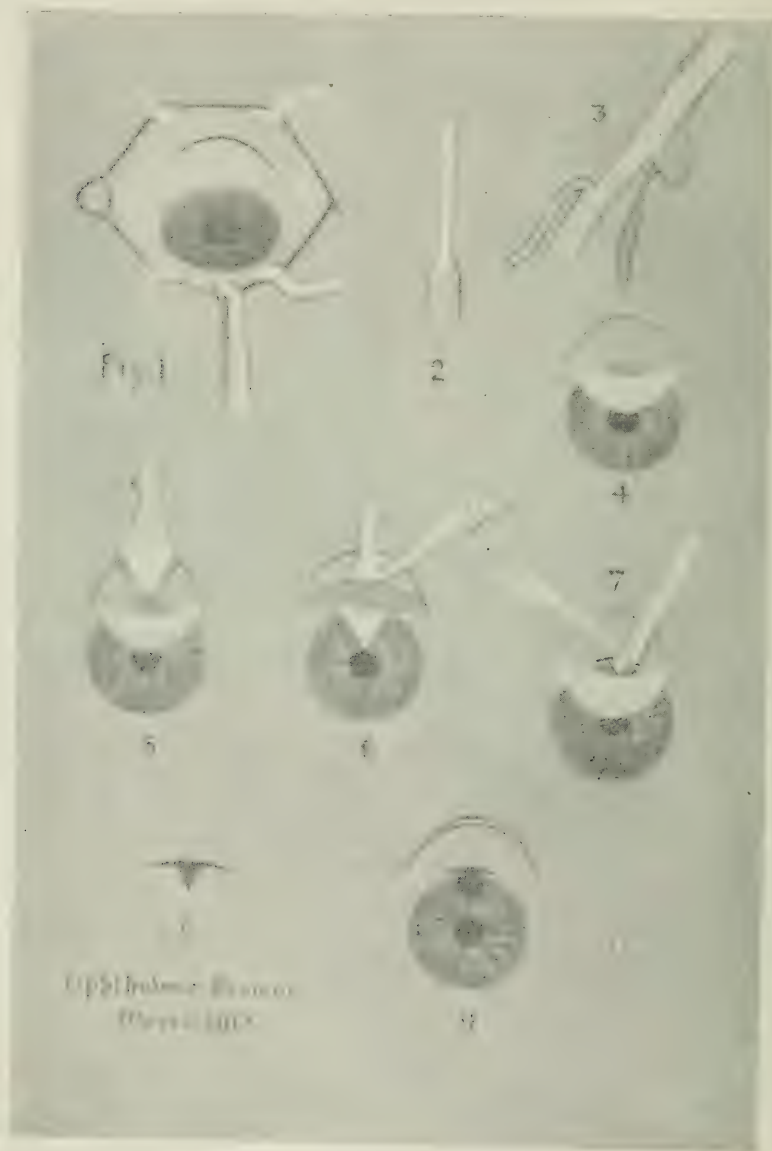
ERNEST THOMSON.

(9) The reader is referred to the original for the description of the modification of Herbert's operation, devised by **Paton**, of London.

ERNEST THOMSON.

(10) **von Mende**, of Mitau, says that, while all recognise the simplicity of Elliot's operation and the immediate relief to tension which it gives, certain complications have been met with, the chief of which are: (1) Prolapse of iris during or after the operation. (2) Iritis or iridocyclitis with formation of synechiæ. (3) Too peripheral an opening, so that the anterior chamber is not tapped, and there is danger of prolapse of vitreous. (4) Slipping of the trephined disc into the anterior chamber, and (5) Buttonholing of the

conjunctival flap by the trephine. The first of these difficulties is, he says, definitely overcome by doing a small basal iridectomy as part of the operation. The second is avoided by the addition of the iridectomy and by the instillation of atropine. The other three complications are, in his opinion, due to the opaque conjunctival flap preventing a view of the relationships of the parts.



He has modified the *technique* to overcome this difficulty, and now dissects up a flap one edge of which is defined by an incision round the limbus. The site of the trephine opening is freed from the epithelium by scraping with a knife, and after the performance of the trephining and the basal iridectomy, the flap

is stitched down into place in such a way as to cover the trephine hole. He has found the results satisfactory.

A. J. BALLANTYNE.

(11) **Schnaudigel**, of Frankfurt, warns surgeons against the form of conjunctival flap recommended by von Mende (*Klin. Monatsbl. f. Augenheilk.*, Jan., 1913, see above). In his opinion, it is of the first importance to preserve the absolute integrity of the conjunctival flap at the limbus and in the four millimetre zone parallel to it. He does not state that he has tried the method under discussion, and appears to be arguing on purely theoretical grounds.

A. J. BALLANTYNE.

(12) The operation described by **David Priestley Smith**, of Birmingham, is essentially a modified sclerectomy. A conjunctival flap is reflected from above the cornea (Fig. 1), as in Elliot's operation, and the cornea is then "split," using for the purpose the instrument shown in Fig. 2. The dissection is continued until the area of exposed cornea forms a slate-grey ellipse, some 2mm. in width towards its middle (Figs. 3 and 4). In the ensuing step, the vitreous is tapped by a Graefe knife, inserted through the sclera 6mm. behind the cornea, and just above the upper margin of the external rectus muscle. The blade is directed towards the centre of the eyeball, with its back to the cornea. A broad keratome is next passed into the anterior chamber, its point entering the sclera less than 1mm. outside the edge of the cornea (Figs. 5 and 6). By means of scissors, a small three-cornered piece is snipped out of the corneal lip of the keratome incision (Fig. 7), so as to leave a triangular-shaped aperture in the corneo-sclera (Fig. 8). Iridectomy is performed in the usual way, although the author endeavours to leave the sphincter intact. Finally, the conjunctival flap is replaced (Fig. 9). Smith has done the foregoing operation (the idea of which is due to Temple Smith) eight times.

SYDNEY STEPHENSON.

VII.—MISCELLANEOUS COMMUNICATIONS ON GLAUCOMA.

- (1) **Dor, Louis.**—Unilateral glaucoma due to congenital malformations. (Glaucome unilatérale par formations congénitales.) *La Clinique Ophthalmologique*, 10 juillet, 1912.
- (2) **Tooke, Frederick.**—Some clinical and pathological aspects of glaucoma: a retrospect of two hundred cases. *Ophthalmology*, October, 1912.
- (3) **Dor, Louis.**—Unilateral glaucoma from congenital malformation. *Ophthalmology*, October, 1912.

(1) The case of unilateral absolute glaucoma which **Dor**, of Lyons, considers to have been due to congenital malformation, is rather obscure in the matter of the history of the patient. According to the latter, he saw quite well with the left eye until he was thirty years of age, and is now forty. At the age of thirty he lost the sight of the eye painlessly, and was told by his local doctor that he had cataract. He was not examined by any specialist until he was seen by Dor, who while finding it impossible to say whether or not the then acute glaucomatous condition had really commenced with a cataract, at any rate, saw with difficulty through the hazy cornea what he took to be lens matter in the anterior chamber. Acting upon the supposition that what he saw was lenticular, Dor made an incision and actually drew off the lens matter including what remained of the nucleus. He had the intention of making an iridectomy, but could not see any iris, in spite of the absence

of any bleeding. A few days later, it was found by oblique illumination that there was absolute aniridia, and, the fundus being now visible, deep excavation of the disc.

The theory of a congenital origin seems to be somewhat supported by the fact that the face presented curious markings over the left side. These markings were attributed by the patient to his having been born with his hand over his face, but by an obstetrician who was asked to see the patient, to the pressure of amniotic bands.

There had been no return of glaucomatous tension in more than six years.

ERNEST THOMSON.

(2) This article by **Tooke**, of Montreal, takes the form of a review on the subject of glaucoma, illustrated from his own material, consisting of two hundred cases. His views on one or two points differ from those usually accepted. In discussing the conditions about the filtration angle, he expresses the opinion, based on numerous microscopical examinations, that the pectinate ligament does not exist, even in the non-glaucomatous eye. There is a pectinate ligament in the fœtus, but the adult eye has only the trabeculæ passing from sclera to cornea and forming the boundary between Schlemm's canal and the anterior chamber. He says that his investigations of the eyes of the lower animals lead him to differ from Priestly Smith with regard to the part played by undue bulkiness of the lens in causing glaucoma, but he does not make his reasoning at all clear. He gives a number of measurements of the eyes of the newborn infant, of the guinea pig, rabbit, pig, white rat, and frog, and of the human eye, in health and in glaucoma. The last two are the most interesting. In the human eye, in health, he finds that the horizontal diameter of the globe is 25 mm., the antero-posterior 25 mm., the diameter of the cornea 12 mm., and the diameters of the lens 8·75 by 6 mm. In the glaucomatous eye the corresponding figures are 22 mm., 21·75 mm., 10 mm., and 9 by 6·5 mm. His statistics showed a very slight preponderance of males over females, and the greatest number of cases occurred between the ages of sixty and seventy. The paper is illustrated by twenty-three microphotographs.

A. J. BALLANTYNE.

(3) The patient described by **Dor**, of Lyons, was a man forty years of age. He had absolute glaucoma with some opacity of the cornea. A cataractous lens was visible in the anterior chamber. After removal of the cataract, aniridia was discovered. There was a deformity of the face on the side corresponding to the affected eye. He gave a history of good vision until the age of thirty, when he was informed by a doctor that he had cataract. Dor does not indicate clearly what he considers to be the connection between the congenital deformity and the glaucoma. He thinks that the aniridia was not congenital, but resulted from atrophy of the iris in the course of the glaucoma.

A. J. BALLANTYNE.

VIII.—METASTATIC GONORRHŒAL INFLAMMATION.

- (1) **Frescoln, Leonard D.**—A case of metastatic gonorrhœal conjunctivitis. *Brit. Med. Journal*, 25th March, 1911.
- (2) **Sidler-Huguenin.**—Concerning metastatic inflammations of the eye in gonorrhœa. *Archives of Ophthalmology*, July, 1912.

(1) A male, aged 30 years, was seen by **Frescoln**, of Philadelphia, suffering from marked conjunctivitis, swelling of one great toe, and discharge

from the urethra. Smears from the inflamed eyes showed no gonococci. At a somewhat later stage irido-cyclitis developed in both eyes. Nothing but the xerosis bacillus was found in aqueous humour evacuated from the anterior chamber of one eye. But the operation appears to have been carried out late in the course of the irido-cyclitis, although the confused style of Frescoln's communication leaves this, no less than other points, shrouded in some obscurity.

SYDNEY STEPHENSON.

(2) **Sidler - Huguenin**, of Zürich, reports on twelve cases of metastatic inflammation of the eye in gonorrhœa. Of these, five had a severe, and four a milder, unilateral irido-cyclitis, and three a bilateral conjunctivitis. All had had one or more attacks of gonorrhœal urethritis prior to the ocular affection. In all that were bacteriologically examined (*i.e.*, ten), gonococci were found in the urethral secretion. There were also various complications, such as cystitis, prostatitis, endometritis, salpingitis, arthritis, etc. In five cases, gonococci were demonstrated in the blood, but in only one case out of six examined with severe irido-cyclitis were gonococci cultivated from the aqueous humour. The author advises, in order to cultivate gonococci from the blood or aqueous, to secure the material during the time of the highest temperature, since gonococci do not seem to circulate in the blood during periods of low temperature. As large a quantity of material as possible should be employed. The author suggests that as there is a true metastatic gonorrhœal conjunctivitis and irido-cyclitis, there may be also a true metastatic gonorrhœal keratitis, chorio-retinitis, neuritis, scleritis, etc. Two other cases also examined were metastatic, but the organism was not the gonococcus. In one case, the staphylococcus pyogenes aureus was cultivated from the blood, and in the other, streptococci and yeast cells were found in both globes *post-mortem*. Two further cases are added in which there had been gonorrhœal urethritis and an abscess formed in the lids, without apparent external cause. In both cases the abscess burst into the conjunctival sac, but no blennorrhœa supervened, although gonococci were found in the pus.

ROSA FORD.

IX.—WORM-LIKE CONTRACTIONS OF THE SPHINCTER PUPILLÆ.

- (1) **Sattler, C. H.**—Worm-like contractions of the sphincter iridis. (Ueber wurmförmige Zuckungen des Sphincter iridis.) *Klin. Monatsbl. f. Augenheilk.*, Dezember, 1911.
 - (2) **Hirschberg, J.**—On worm-like contractions of the sphincter iridis. (Ueber wurmförmige Zuckungen des Schliessmuskels der Regenbogenhaut.) *Centralbl. f. prak. Augenheilk.*, Januar, 1912.
 - (3) **Münch, Karl.**—The question of the worm-like movements of the sphincter pupillæ. (Zur Frage der wurmförmigen Zuckungen am Sphincter pupillæ.) *Klin. Monatsbl. f. Augenheilkunde*, Juni, 1912.
 - (4) **Sattler, C. H.**—The question of the worm-like movements of the sphincter pupillæ. (Zur Frage der wurmförmigen Zuckungen am Sphincter pupillæ.) *Klin. Monatsbl. f. Augenheilkunde*, September, 1912.
- (1) By "worm-like contractions" **Sattler**, of Königsberg, means very slight movements of the pupillary margin of the iris, which progress from point to

point. They were so slight as to be invisible to the naked eye, and were discovered during examination with the binocular *loupe*. The case in question was a young woman convalescent from influenza. Accommodation was paralysed. Pupils were inactive, the right slightly larger than the left, and not perfectly round. The peculiar movements described were made more frequent and more pronounced by sensory and psychical stimuli. Homatropine abolished the movements, but cocaine did not, thus showing that the sympathetic supply was not involved. The author attributes the phenomenon to irritation, probably at the nucleus of the third nerve, and thinks it may be analogous to the fibrillary movements of syringomyelia, due to irritation of motor ganglion cells. It is also suggested that it may be a partial form of hippus, similar to those reported by Bach and Uhthoff in the case of partial recovery from paralysis of the sphincter.

A. J. BALLANTYNE.

(2) In connection with a report of a similar case by Sattler (see above), **Hirschberg**, of Berlin, reports the following case.—Patient, a lady, aged 73 years, consulted him about a superficial keratitis of the left eye. On examining the right (healthy) eye, he found down and out a local thickening of the pupillary border, and this thickened portion was in a constant state of wormlike contraction. He had never seen anything resembling this before, and he assumed a congenital local hyperplasia of the sphincter muscle. During the fifteen months the patient was kept under observation, no enlargement of this spot could be noticed.

A. LEVY.

(3) In the *Klin. Monatsbl. f. Augenheilkunde*, December, 1911, Sattler referred to the occurrence of worm-like movements of the sphincter pupillæ in a case of ophthalmoplegia interna, and expressed the view that it was a hitherto undescribed phenomenon, and that it was pathological in nature. **Münch**, of Göppingen, refers the reader to a communication of his own, abstracted in the *Monatsblätter* of July, 1907, in which he claims to have described the same phenomenon, taking the view that it was a physiological occurrence. He observed it best in his own eye, using his "*Pupillenauteskop*" for the purpose. He attributes the failure of Sattler and others to find it under normal conditions to the fact that the usual forms of apparatus employed for obtaining a magnified view of the pupil, cast a direct and powerful light into the eye. In his own method, the illumination is weak and lateral, the pupil dilates to about six millimetres, and when the retina has become adapted, the movements of pupillary unrest take the form of a peristalsis. This is manifested as a drawing together of the radially disposed iris vessels in a small segment of the pupil margin, and a corresponding separation of the radial striæ in the neighbouring segments. These changes move from point to point, and may even give the impression of a wave travelling more or less completely round the pupil. He has observed the same thing in other normal eyes, but not so well as in his own. This he attributes to the greater difficulty in obtaining the necessary condition of repose. He believes that the phenomenon is physiological, and that it can always be found in weak illumination, and with the adapted retina.

His explanation of the occurrence is somewhat as follows.—The sphincter pupillæ consists of 70 to 80 physiological segments, each of which is supplied by a separate nerve twig. They usually act in a co-ordinated manner, but each has a certain individuality. The length of a "physiological segment" is the same as the average length of a smooth muscle fibre. With a moderately wide pupil, and with the retina adapted to a weak illumination, the independence of the segments referred to is manifested by the conversion of the movements of pupillary unrest into fine localised twitching movements which convey an impression of a worm-like or

peristaltic change. When a stronger light stimulus falls upon the eye the strong and rapid response takes the form of an *apparently* simultaneous contraction of all the segments.

A. J. BALLANTYNE.

(4) **Sattler**, of Königsberg, returns to the subject of worm-like movements of the sphincter pupillæ, and deals in particular with some of the statements made by Münch in a paper on the same subject in the June number of the *Klin. Monatsblätter*. The conclusions he arrives at are as follows.—Very slight worm-like movements are sometimes, but not always, to be seen, in the normal eye. They are much more easily to be observed in disease conditions, especially such as are accompanied by a sluggishness or abolition of the pupillary reactions, whether this sluggishness is produced by a central lesion, by a lesion in the conducting path, or by a local affection of the iris. The movements, when present, are abolished by atropine and pilocarpine, but are unaffected by cocaine. In some cases in which the movements were present with deficient activity of the pupillary reflexes, a return or improvement of the latter was accompanied by greater difficulty in observing the abnormal phenomenon. As a rule, the worm-like movements were less noticeable if pupillary unrest was present. They were often more distinct in part of the sphincter than in others. The nature of the exciting stimulus is still unknown.

A. J. BALLANTYNE.

X.—REMEDIES.

(Third Notice.)

- (1) **Birch-Hirschfeld**, A.—On the treatment of retinal detachment. (Für Therapie der Netzhautabhebung.) von Graefe's *Archiv f. Ophthalmologie*, Bd. LXXXII, Heft ii, 25 Juni, 1912.
- (2) **Antonelli**.—Cranial polyneuritis, especially oculo-motor, after treatment by arsenobenzol. (Les polynevrites craniennes, oculomotrices en particulier, après traitement par arsénobenzol.) *Archives d'Ophthalmologie*, septembre, 1912.
- (3) **Péchin**.—Paraplegia following one injection of arsenobenzol in a hereditary syphilitic female affected with parenchymatous keratitis. (Paraplégie à la suite d'une injection d'arsénobenzol chez une hérédo-syphilitique atteinte de kératite parenchymateuse.) *La Clinique Ophthalmologique*, 10 octobre, 1912.
- (4) **Gonzalez**, Jose de Jesus.—Leproma of iris cured by radium therapy. *Ophthalmology*, October, 1912.
- (5) **Santos-Fernandez**, J.—Mydriasis due to adrenaline. (Mydriase due à l'adrénaline.) *Revue Générale d'Ophthalmologie*, 31 octobre, 1912.
- (6) **Abadie**, Charles.—On tuberculin treatment. (De la tuberculinothérapie.) *La Clinique Ophthalmologique*, 10 décembre, 1912.
- (7) **Anderson**, Frederick A.—Interstitial keratitis. *Dublin Journal of Medical Science*, February, 1913.

This paper, by **Birch-Hirschfeld**, of Leipzig, is based upon the results of his experimental researches on the pathology and treatment of artificial retinal detachment in the rabbit (v. Graefe's *Archiv f. Ophth.*, Bd. LXXIX, Heft ii) and also on Elschnig, Löwenstein, and Samuel's work (*Ibid.*, Bd. LXXX,

S. 500) on the substitution of isotonic saline for the replacement of diseased vitreous. Birch-Hirschfeld's operation closely resembles Elschnig's method. The principal difference is that he does not generally inject saline, but either the evacuated preretinal fluid—which sometimes caused considerable inflammatory reaction—or else, should it be too rich in albumen, a mixture of it with isotonic saline (0.8 per cent.) He also thinks that a much larger quantity can be safely injected than Elschnig states, in some cases up to 2 c.cm., while Elschnig discourages anything over 0.6 c.cm. In judging Birch-Hirschfeld's results, it must be borne in mind that the worst cases only were operated on; in no case did he resort to his operation before every chance of success by milder methods had disappeared. On the other hand, Birch-Hirschfeld himself admits that the operation is technically difficult, and inexperienced operators may not have the same success in performing it. But of twenty operated cases, one proved to be choroidal sarcoma. Of the remaining nineteen, eight were considerably, four slightly improved, three remained unchanged, and four progressed. Inflammation supervened in six cases, five of which were ultimately successful.

It is interesting for comparison to quote the results of the older treatment from the Eye Clinic of Leipzig.—During the last 11 years, 142 cases of detached retina were treated, 18 by rest only with two successes (11 per cent.) 65 cases by subconjunctival injections, of which five (7.7 per cent.) obtained considerable and eight (12.3 per cent.) slight improvement; simple puncture was performed in 17 cases, four of which were transitorily improved, and combined with cauterisation in 34 cases, with one considerable, and ten slight improvements. Deutschmann's operation was done four times, once with signal benefit. But, of course, cases are of a very different character, and cannot be compared without considering their details. R. GRUBER.

(2) A healthy man of 39, who had acquired syphilis two months previously, was sent to **Antonelli**, of Paris, for the onset of ophthalmic symptoms.

An injection (0.40) of arsenobenzol had been given intravenously one month after the appearance of the chancre and with no immediate effects. Two days later, however, headache, vertigo, and tinnitus aurium were complained of. The symptoms were regarded as syphilitic, and accordingly another injection (0.50) was given, again without immediate effects, but with the onset of visual troubles and diplopia some five or six days afterwards.

The following condition was at that time noted by Antonelli.—“Paralysis of the left facial nerve (peripheral type), convergent strabismus due to paralysis of the right sixth nerve, double papillitis. Paralysis of the right eighth nerve. Visual acuity of R.E.=0.7, of L.E.=0.2. The swelling of the discs and the vascular alterations moderate in intensity, although more marked in the left eye, where they were accompanied by flame-shaped hæmorrhages.” Some improvement took place in the paralysees of the sixth and seventh and also in the papillitis of the left eye, but in the right eye this increased ($V.=2/60$). The case was not seen again by the author, but the subsequent history was obtained to the effect that about six weeks after the second injection, there was paralysis of the right third nerve and a spinal paralysis on the same side.

The Wassermann reaction of the serum and the cerebro-spinal fluid was very marked, and there was much lymphocytosis of the latter.

Some improvement took place with subsequent small injections of arsenobenzol and benzoate of mercury, with potassium iodide internally.

The ptosis and paralytic strabismus of the right eye persisted, however, the pupils remained very sluggish to light and the discs became atrophic in appearance, with reduction in visual acuity, especially in the right eye.

In discussing the pathogeny of this and similar cases, Antonelli inclines to the following theory as best founded to interpret the facts, namely, "that the toxic action of arsenobenzol, although slight as compared with other arsenical compounds, has an effect on the cranial nerves or the auditory apparatus, and there gives rise to a *locus minoris resistentia* for the onslaught of the syphilitic virus."

He urges periodic ophthalmoscopic examination of cases undergoing this treatment, and holds that the new remedy—"valuable, without doubt, but redoubtable"—should be reserved for the exceptional cases, which for various reasons demand other than the conventional methods.

BERNARD CRIDLAND.

(3) **Péchin**, of Paris, is quite in favour of the use of "606" and "914," but thinks it advisable to report the unusual case of a girl of fifteen years who, after one injection of 20 centigrams of Salvarsan, suddenly became paraplegic on the sixth day. This paralysis was not preceded by the signs associated with the premonitory period often observed in syphilitic paraplegia. The patient appears to have gone to bed well and been unable to rise in the morning. The author has no doubt whatever that the drug was to blame.

ERNEST THOMSON.

(4) **Gonzalez**, of Leon, Mexico, describes an example of the rare iridic lesion of leprosy, namely, a large leproma of the iris. It was cured by four applications of the X-rays, each of five minutes' duration, and extending over a period of four months.

A. J. BALLANTYNE

(5) **Santos-Fernandez**, of Havanna, after the constant employment of adrenaline in daily practice for a number of years, comes to the following conclusions as to its action on the pupil.—(1) Mydriasis produced by adrenaline is infrequent. (2) It is easier to observe it under physiological conditions than when there is an inflammation or severe affection of the eye. (3) Adrenaline mydriasis may be avoided by the association of alypin with it, and is provoked by the association of cocaine.

ERNEST THOMSON.

(6) In this short article **Abadie**, of Paris, comes to the rescue of tuberculin, which had been attacked in the following words by Dr. Jousset.—"In my opinion, tuberculin therapy is a method which is absolutely and irrevocably to be condemned, and that from three standpoints: it is dangerous, useless and illogical."

Abadie points out that whatever may be the case in pulmonary tuberculosis, about which the foregoing was written, the words are not true of eye diseases. In ocular tubercle the lesions are there to be seen and it can be determined without a doubt whether they get better or worse under treatment. In ocular tuberculosis doubt is no longer possible as to the value of tuberculin.

ERNEST THOMSON.

(7) On the assumption that a great many cases of interstitial keratitis are caused, not by syphilis alone but by a combination of that disease with tuberculosis, **Anderson**, of Dublin, urges treatment by tuberculin, essentially by Wright's method of small doses at long intervals. As auxiliary measures, it is very important to flush the disease-focus with body fluids containing opsonin, and this may be accomplished by the subconjunctival injection of 4 per cent. saline or by the application of dionin. SYDNEY STEPHENSON.

CORRESPONDENCE.

[While THE OPHTHALMOSCOPE will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.]

THE MAYOU-ZORAB OPERATION FOR GLAUCOMA.

To the Editor of THE OPHTHALMOSCOPE.

DEAR SIR,

In reply to your letter* I have performed the thread operation for glaucoma some ten more times, using the same method which I described in THE OPHTHALMOSCOPE of May, 1912, with the exception that rather larger thread was employed. In all the cases, with the exception of three, the tension was relieved and a good result obtained. In one of the three cases the patient was relieved by repetition of the same operation, one by iridectomy, and one by trephining. In no instance was there any trouble from the insertion of the thread, but in one case the thread worked out underneath the conjunctiva three months after the operation and was subsequently removed, but a permanent leaking scar seems to have resulted.

Recently, I have taken to trephining, and I am inclined to think that, on the whole, the latter will probably give better final results than the thread operation.

Yours very truly,

59, HARLEY STREET, LONDON, W.

STEPHEN MAYOU.

THE METHOD OF EXAMINING THE COLOUR SENSE.

To the Editor of THE OPHTHALMOSCOPE.

SIR,

I have read with interest the translation of the article "On the Significance and the Method of Examining the Colour Sense," by Professor Stargardt and Fleet-Surgeon Oloff, in the February issue of THE OPHTHALMOSCOPE.

There is one conclusion they have come to with which I cordially agree, and that is in the unequivocal manner in which they condemn the Holmgren test. The defects, however, of this test were first pointed out by Edridge-Green, and not by Nagel, as the authors state. They might have written a valuable contribution on the subject had they gone a step further and condemned the trichromatic theory on which the test is based in a similar manner. This, however, they have not done, with the result that they have tied themselves up in the most extraordinary knots in their vain endeavour to explain and to separate cases of colour blindness into satisfactory groups. No one has yet succeeded in doing this on the trichromatic theory, and it is unlikely that subsequent observers will be more successful. With regard to the tests, the one they recommend as being the most free from objection is the "Anomaloscope," the action of which depends upon the fact that spectral red and green, when mixed in certain proportions, produce yellow, which can be matched with spectral yellow. It was Edridge-Green who showed that this test was hopelessly inadequate, because normal-sighted people vary greatly in the proportion of red and green which they use in order to produce yellow, while many colour blind people make the match with precisely the same proportions as the majority

*In view of Mr. Zorab's communication dealing with "Aqueoplasty," published on p. 211 of the present number of THE OPHTHALMOSCOPE, an enquiry was addressed to Mr. M. S. Mayou, the other advocate of the operation, requesting him to give us his later experience of the method.—EDITOR.

of normal-sighted people. It is really no test for colour blindness at all, but as it depends upon the trichromatic theory, it is apparently the best they are able to find, hopeless though it be. In a recent paper before the Royal Society, Edridge-Green showed that colour weakness and anomalous trichromatism are not necessarily associated, and if this be so, the test at once fails.

They do not consider that the Nagel test comes up to expectations, as the "results obtained with it were very often contradictory and inadequate."

The test they most advocate for general use is that of Stilling (which, however, is not based on the trichromatic theory), "the results of which are always confirmed by the Anomaloscope. A great advantage lies in the fact that any naming of colours is unnecessary." When will the old prejudice against the use of names be laid to rest? If any person were to suggest that an examination, say, in surgery, should be conducted without the use of anatomical names or the names of instruments, would he be considered sane? What possible advantage can there be in examining a man in colours in dumb show? How many years will it take to eradicate this fetish? It appears to be about as hopeless to expect people to acknowledge that colour names must be used in any reliable test for colour blindness as it is to expect anti-vaccinationists to admit that small pox has been practically eradicated by vaccination where this has been compulsory. Stilling's test is one of the very easiest in which to coach a colour-blind person, easier than the Holmgren test, even though colour names be used (which the authors do not allow, and thus they render it even less efficient), so that we are certainly not likely to get much improvement in the deplorably bad results which are given by all tests which are based on the trichromatic theory. It is a pity that so much work as the authors have evidently done on the subject should have been spoilt and rendered useless by their blind adherence to the trichromatic theory, which will not satisfactorily explain a single case of colour blindness. There is, however, no known fact concerning colour vision which cannot be explained on the Edridge-Green theory.

112, HARLEY STREET,
LONDON, W.

I am, etc.,

C. DEVEREUX MARSHALL.

OPERATIONS FOR GLAUCOMA.

To the Editor of THE OPHTHALMOSCOPE.

SIR,

Professor Lagrange, in his very kind letter in your March issue, clearly defines his own claim, and at the same time acknowledges that I have made no claim. I thank him for thus modifying the position he originally took up. My only desire has been, and is, to simplify the procedure of anterior sclerectomy, and so to convert it from a difficult and dangerous into a safe and easy procedure. I would, however, remind Professor Lagrange that when contemporary writers give a surgeon's name to an operation they do so, not to give him honour, but to further their own convenience. They use his name, in fact, as a label. Thus history is made.

"The moving finger writes; and having writ,
Moves on; nor all thy piety nor wit
Shall lure it back to cancel half a line,
Nor all thy tears wash out a word of it."

R. H. ELLIOT.

OFFICE OF THE SUPERINTENDENT,
GOVERNMENT OPHTHALMIC HOSPITAL,
MADRAS. February 27th, 1913.

BOOK NOTICES.

Vicious Circles in Disease. By JAMIESON B. HURRY, M.A., M.D. (Cantab.) London: J. and A. Churchill. Second edition, 1913. 280 pages, illustrated. Price 7s. 6d.

We congratulate Dr. Hurry on the second edition of his unique work on *Vicious Circles in Disease*. The text has been revised, and six new chapters added. It is only two years since we reviewed "*Vicious Circles*," and since only a small portion of the book refers directly to ophthalmology—although the whole work is interesting—it will perhaps suffice, on the present occasion, to refer readers to *THE OPHTHALMOSCOPE* for 1911, page 387.

ERNEST THOMSON.

Angiomatosis of the Retina (von Hippel's Disease). Die Angiomatose der Retina (von Hippelsche Krankheit). By Dr. A. VOSSIUS. *Sammlung zwangloser Abhandlungen aus dem Gebiete der Augenheilkunde*, Band IX, Heft i. 1913. Halle: Karl Marhold.

The condition which is the subject of this *brochure* by Vossius, of Giessen, has only recently come to be looked upon as a clinical and pathological entity, although a number of cases which apparently belong to this category are scattered through the literature. Perhaps the first of these was a case described by Fuchs in 1882, under the name of "*Arterio-venous Aneurysm of the Retina*." It differed in important respects from the recorded cases of veritable arterio-venous aneurysm, and v. Hippel showed that its true place was among the group of cases now under discussion. The same appears to apply to a case described by Darier, in 1890, as one of "*Cystoid degeneration of the Retina*."

v. Hippel's first contribution to the subject was made at the Heidelberg Congress in 1903, when he defined the clinical features of the condition on the basis of two cases of his own, along with the few examples which he was able to trace in the literature. The picture was completed by his discussion of the pathological anatomy, which appeared in a paper published in v. Graefe's *Archiv* in 1911. In the interval about a dozen cases had come to light, and among these was one in which Czermak had the opportunity to submit both eyes to microscopic examination. This case had been under observation as early as 1896, when it was diagnosed as "*Interstitial Fibromatous Degeneration of the Retina*." von Hippel's description of the pathological anatomy of angiomatosis of the retina was based on this case of Czermak's, on three eyes examined by E. Treacher Collins, and on an eye obtained from one of his own cases. (Treacher Collins' eyes were from two cases, brother and sister, reported by David J. Wood, and his description antedated that of Czermak. David J. Wood reported a third case in 1909, and a good picture of the condition of the fundus will be found in the *Transactions of the Ophthalmological Society U.K.*, Vol. XXIX., plate iii.) The cases examined all agreed in presenting a capillary angiomatosis of the retina.

In the present booklet Vossius illustrates and describes in detail two further cases, bringing the total number of cases now on record to twenty-two. His illustrations are faint, and by no means so satisfactory as the coloured picture in Wood's paper above referred to. We may omit the details of his cases, and proceed to summarise the features which he describes as common to the group.

On ophthalmoscopic examination, we find a pronounced dilatation and tortuosity of one or more of the retinal arteries and of the corresponding veins. The vein is usually more dilated than the artery, and the normal colour difference is reduced. The dilatation of any one vessel varies from point to point, and there may even be constriction in places. Knob-like dilatations may appear. Red or yellowish-red structures, of spherical or ovoid form, make their appearance in the course of the vessels, or arteries and veins seem to empty themselves into such balloon-like bodies. The globular bodies first make their appearance in the periphery of the fundus, and may therefore exist for some time before they occasion any visual disturbance. The difficulty of distinguishing arteries and veins in the ophthalmoscopic examination is also met with in the microscopic preparations, and is attributed to the presence of marked thickening of the adventitia and intima of the vessels. The smaller globular red masses are superficial angiomas, composed of fine capillaries with a small amount of glia tissue, while, with further growth of connective tissue, they increase in size and assume a more yellow tint. With the extension of the disease to other branches of the retinal vessels the nervous elements of the retina are involved, and thickening and detachment of the retina occur. Total blindness results, and after a protracted, painless course, secondary glaucoma may supervene, and necessitate enucleation for the relief of pain.

In addition to the appearances described, there may also be minute glistening dots, large yellowish white patches, and retinal hæmorrhages of larger or smaller size. These are among the later developments, and have not been observed in every case. Bone formation in the choroid has been found in all the cases microscopically investigated, and is apparently a secondary phenomenon appearing in the later stages.

Most of the patients have been between twenty and thirty years of age. The earliest stages of the affection have not been observed, owing to the fact that visual loss only makes itself felt after the disease has become well established, but the histories given by some of the patients show that headache, epistaxis, and flickering and cloudy vision, are among the early symptoms. Central and peripheral scotomata often appear in the field of vision. The affection is as often unilateral as bilateral, and the sexes are equally often affected. The cause of the changes described is still unknown. Injury, tubercle, and syphilis have been suggested, but have been set aside on further investigation. There is something to be said for the belief that a congenital anomaly may underlie the condition.

A. J. BALLANTYNE.

A Text-Book of Diseases of the Eye. (Lehrbuch der Augenheilkunde.)

By Professors AXENFELD, BACH, BIELSCHOWSKY, ELSCHNIG, GREEFF, HEINE, HERTEL, v. HIPPEL, KRÜCKMANN, OELLER, PETERS, and STOCK. Edited by Professor AXENFELD. Third Edition. Price, M, 15 (bound. M. 16.50). 1912. Jena: FISCHER.

The first and second editions of this text-book, which appeared in 1909 and 1911, were reviewed in *THE OPHTHALMOSCOPE*, Vols. VII and IX. The present edition follows on the second even more rapidly than did the first, and furnishes further evidence (were such necessary) of the value of this work.

Professor Axenfeld and the whole ophthalmic world suffer a loss in the death of Professor Bach, whose "Diseases of the Lens" in the work under review indicates how difficult will be the filling of his place.

There is a small addition to the size of the volume. The whole bears witness to the most careful revision, and the illustrations, which before seemed

to be entirely adequate, have been still further enriched by the addition of several excellent figures. Special attention has been paid to the fusion of the different chapters by different writers into one complete whole, and the result has been successful.

Axenfeld's "Introduction to Ophthalmic Treatment" sets the high standard of the Editor, and is a mine of information. It has been very ably revised, and as instance of its modernity are to be found notes on the Wassermann reaction, the use of the various tuberculin preparations, the use of Salvarsan in optic atrophy, and the modern forms of protective glasses in the form of ultra-violet light filters. This chapter also contains valuable information on the removal and introduction of artificial eyes, warnings against the excessive use of cocaine, against the old-fashioned dark and ill-ventilated sick room, with many other practical hints valuable alike to the experienced surgeon and to the student. There is a slight error in the use of the word "tabloid," when referring to gelatine discs.

In the "Examination of the Eye," the added emphasis put on *Method* will appeal to every teacher, as also the corollary a warning against the "spot-diagnosis." Special attention is paid to the examination of children, the use of a general anæsthetic in certain cases being rightly insisted on.

Heine's chapter on "Function Testing" shows how a concise statement of the facts of refraction, defects in the field, binocular vision, and colour vision can be made in a limited space without confusion. He is particularly sound on the treatment of myopia. "Full correction is not a panacea, but, combined with a rational hygiene, is one of the best methods of arresting the progress of the myopia." Whatever view may be held as to "colour theories," only one is possible of the able manner in which the accepted Continental view is presented in this chapter.

Small textual alterations are to be noted in the chapters by Elschnig, Bielschowsky, v. Hippel, and Stock, which either improve on the previous text, or refer to the new illustrations. Krückmann's chapter on the diseases of the uveal tract, after three years' acquaintanceship, still appears the best presentation of this difficult subject, but with one flaw, namely, the absence of reference to oral sepsis, and the assistance which the practitioner can often get in treating some of the most difficult and refractory cases by careful attention to the teeth and gums, especially with the co-operation of a dentist.

Throughout the other chapters is evidence of care in producing this edition. On glaucoma, the recent operations of Lagrange, Herbert, and Elliot are figured and discussed. The subject of injuries and insurance is excellently handled. The plates, which were such a feature in the second edition, have been added to by another of Professor Oeller's masterly drawings, and form a fitting climax to a volume which can be heartily recommended both to the student and to the ophthalmic surgeon.

ANGUS MACNAB.

The Anatomy and Histology of the Human Eyeball in the Normal State, its Development and Senescence. By Dr. MAXIMILIAN SALZMANN, of Vienna. Authorized translation by Dr. E. V. L. BROWN, of the University of Chicago. Chicago: Chicago Medical Book Co., Congress and Honore Streets. 1912. Price, 5 dollars.

We are glad that by the enterprise of Dr. E. V. L. Brown, of the University of Chicago, a translation of Saltzmann's *Anatomie und Histologie des menschlichen Augapfels in Normalzustande* has been placed in the hands of English readers. The original was favourably reviewed in our columns last year

(p. 118) by Mr. George Coats. We need now only say that the translation appears to be worthy of the original. The reproduction of the plates in photocollotype is also beautifully carried out. The omission of an index, however, is very inconvenient to readers.

Miners' Nystagmus: Its Causes and Prevention. By T. LISTER LLEWELLYN. London: The Colliery Guardian Company, Ltd., 30 and 31, Farnival Street, Holborn, E.C. 1912. Price 6s. 3d., post free.

As a specimen of the printer's art, this book has little to recommend it: it is bound in red and has red edges. The print is small, and each section and subsection is headed in heavy black type, which is both irritating to the reader and highly inartistic. The photographs are not reproduced in a style worthy of the importance of the book. However, in this case a rough setting holds a gem of the first water. We have nothing but praise for the subject-matter of the book, which is a credit to the talented author.

Dr. Llewellyn, as Tyndall Research Mining Student of the Royal Society, and Medical Officer to two Mining Corporations, has had unrivalled opportunities for studying the subject, and he has embodied his researches in a book which may ultimately come to be regarded as a classic.

The work is intended not only for medical men, but also for colliery engineers and directors, and so it commences with a short account of the anatomy and physiology of the eye. Professor J. S. Haldane has contributed a preface, and Mr. Douglas Knocker has written the legal appendix, which is exceedingly valuable.

We are in full accord with the views advanced by the author, which are those now almost universally accepted by English surgeons who have been able to study the subject practically.

He believes that deficient illumination is practically the sole cause of miners' nystagmus, and states that, in his opinion, when the safety lamp is replaced by an electric lamp, the disease will disappear. If this be the case (and we believe it is) it is high time that Government made the use of these lamps compulsory. The matter is an urgent one. The author points out that nystagmus is now costing the country at least £100,000 a year, and is causing much suffering.

A comparison of Llewellyn's book with Ohm's on the same subject* is interesting; they indicate in a striking manner the essential differences between the English and German mind. Llewellyn's work is intensely practical, his book takes us direct to the coal miner at his work, and at once shows us the obvious cause of the disease and the simple method of banishing it from the colliery. Ohm's book is strictly scientific. We see the author carefully registering the oscillations with a Bay's capsule, and observing the movements with his double ophthalmoscope; but he misses the point, and comes to no real conclusion regarding the ætiology of the disease. The two books are strictly complementary, and both are necessary for a full comprehension of the disease.

Llewellyn does not tell us his reason for stating that there is no linear nystagmus, but that in all cases it is elliptical. If this be so, then Ohm's records must be all erroneous. We believe that Llewellyn is wrong here. Nearly all authors recognise the linear form. He has also failed to recognise the fact the eyes move in a direction opposite to each other, one up the other down, or both converging or diverging together. The two books differ as to the effect of alcohol. Ohm says that a sufficient dose abolishes nystagmus for

* Reviewed in THE OPHTHALMOSCOPE of February, 1913, p. 127.

a time. Lewellyn says alcohol makes the disease worse. Probably both views are correct.

We congratulate the author on producing a book which is a *vade mecum* of the disease. We hope, however, that the next edition may be bound and printed in worthier style.

T. HARRISON BUTLER.

Sclero-corneal Trephining in the Operative Treatment of Glaucoma.

By ROBERT HENRY ELLIOT, Lieut.-Colonel, I.M.S. London: The Ophthalmoscope Press; George Pulman & Sons, Ltd., Thayer Street, W. 1913. Price, 7s. 6d. net.

In this little volume of rather more than one hundred pages Elliot seeks to sum up the present position of the operation to which he has devoted so much attention during the past three or four years. The operation, to which he gives the name "*Sclero-corneal trephining*," was at first introduced as a modification of, and, in his opinion, an improvement on, the sclerectomy of Lagrange, but it has come to be known by the name of Elliot, not only because he independently conceived the idea of employing the trephine in this connection, but because he has given close study to the principles and *technique* of the operation, which now differs in certain important respects from the other modern procedures which aim at the production of an iris-free filtering cicatrix.

In a short introductory chapter, in which he traces the reasons which led him to adopt the trephine in the performance of sclerectomy, it is made quite clear that his procedure was based on the operations of Lagrange and Herbert, which he believed to have proved that it was possible to establish a permanent filtration between the anterior chamber and the subconjunctival tissue, with a permanent reduction of intra-ocular tension. This historical introduction is supplemented in Chapter II. by a paper on "*The trephine in the treatment of glaucoma*," by Sydney Stephenson, and a review of "*The newer operations for glaucoma*," by A. J. Ballantyne, both of which were in the first instance published in the pages of THE OPHTHALMOSCOPE.

Chapter III. deals with the indications for the operation. The author's own practice is to employ sclero-corneal trephining in all forms of primary glaucoma. If the object aimed at in simple chronic glaucoma is the establishment of permanent drainage and permanent reduction of intra-ocular pressure, then it is claimed that no operation has been devised which is at the same time simpler, quicker, more free from risk, and more certain in its results than this. In acute glaucoma, with the aid of a subconjunctival injection of cocaine and adrenalin, the operation can be painlessly performed, and it has the advantage that the relief of tension can be very gradually brought about. The author has obtained good results in acute as well as in chronic cases. A group of cases which come in for special consideration in this chapter are cases of glaucoma resulting from the presence of a cataractous lens. Such a complication, although practically unknown in most European clinics, is of relatively frequent occurrence in Madras. It occurs more frequently in females than in males, usually with cataract of long duration, and especially where the cataract is of the intumescent type. The author's experience of trephining prior to extraction in these cases has not been an encouraging one. The semi-fluid lens is apt to block the trephine hole and lead to further trouble, and, on the whole, he inclines to return to the earlier procedure of preliminary iridectomy followed by extraction when the eye has quietened down. In staphyloma cases a satisfactory reduction of tension was usually

obtained, and in some the vision improved. In glaucoma following the extraction of cataract, considering the unsatisfactory nature of the cases, the results obtained were distinctly encouraging.

In his Indian practice Elliot regularly performs "prophylactic" trephining on the unaffected eye, on two grounds: first, because his experience shows that the disease is always sooner or later bilateral; and secondly, because it is impossible to ensure the timely return of the patient when the disease affects the hitherto healthy eye.

Chapters IV. and V. deal with the preparations for the operation and the *technique* of the operation itself. In the preparation of the eye some stress is laid on the thorough irrigation of the conjunctival sac with 1/3000 bichloride of mercury solution, followed by swabbing out of the recesses. In chronic cases a trial bandage is applied overnight, and operation is postponed if discharge makes its appearance. In acute cases the trial bandage is omitted. The efficacy of the antiseptic methods employed is proved by the absence of any case of destructive inflammation among more than 780 operations. Dry sterilization is employed for the instruments and the instruments, and hands are kept dry. Mouth masks are worn by the operator and his immediate assistants. Under the heading of *technique* the only two points which appear to be somewhat new are the form of the conjunctival flap and the method of splitting the cornea before applying the trephine. The flap is now no longer defined by incisions ending at the limbus, but by incisions which run almost parallel to the limbus and end at points about four millimetres from the corneal margin in an upward and inward and upward and outward direction. This large flap is believed to allow of much freer filtration than the smaller one originally employed. In clearing the area for the application of the trephine, the author has now adopted the suggestion of Captain Hingston, to use an ordinary Bowman's needle, instead of the scissors points, for separating the conjunctival layer of the cornea from the deeper parts. The various modifications of *technique* described in the following chapter have appeared in papers which, for the most part, are easily accessible. They consist chiefly in modifications of the trephine or in the adoption of methods for guiding and fixing it.

Two interesting sections follow on the complications which may occur during the operation or after it. It appears that the loss of the disc of sclera into the anterior chamber, which occurs chiefly when the smallest trephines have been used, has been met with in about 1.6 per cent. of the cases. In none of Elliot's own cases has it led to iridocyclitis. Vitreous loss has been met with only in cases of long standing. Intra-ocular hæmorrhage has not been altogether eliminated, but the author holds that if the conditions favourable to its occurrence are present, trephining is the safest operation to employ. He thinks also that plugging of the wound by vitreous, lens, or uvea, can occur only if there is intra-ocular hæmorrhage or if the operator pulls on the uvea in making the iridectomy. Among the complications which have been met with after the operation are shallowing of the anterior chamber, displacement of the conjunctival flap, hæmorrhage in the anterior chamber, iritis, prolapse of the iris, blockage of the opening by the lens, and recurrence of high tension. Referring to the last, Elliot admits that there appear to be cases in which even repeated trephinations do not satisfactorily reduce the tension. Like all other investigators with a wide experience of glaucoma, the author has met with many cases which throw doubts on the finality of our present classification of the disease and its varieties, and it is obvious that the pathologist must throw more light on the subject before we can look for uniformly successful results from any method of treatment.

A chapter of the book is devoted to the method employed for the keeping of records of glaucoma cases in the Government Ophthalmic Hospital at Madras. It comprises a very extensive and detailed account of each case, and if it is conscientiously carried out in the large mass of material which the author has at his disposal, the result must be a series of records which will be of the greatest value in future work on the subject. Some idea of the extent of this material is gained from the fact that the author now has records of over 780 trephining operations.

The greatest interest naturally attaches to the results obtained with the operation in glaucoma. The author has long since, like Lagrange and Herbert, established his claims that his operation enables the surgeon to set up a filtration between the anterior chamber and the subconjunctival space, and that in this way a permanent reduction of elevated intra-ocular pressure can be obtained. We think he has still to prove that the result is capable of delicate adjustment, according to the degree of effect desired. The author classifies his cases according to the amount of vision which was present before operation, indicating in each group the character of the visual results obtained. We need not follow him in his analysis of these figures. Suffice it to say that in individual cases excellent results have been obtained in all forms of the disease, and that, taking the cases as a whole, the results of the operation have been most encouraging.

The profession owes much to Lieut.-Colonel Elliot for the painstaking work he has devoted to this subject. He makes no extravagant claims on behalf of the operation of sclero-corneal trephining, but, believing in the soundness of the principle on which it is based, he has striven to perfect its *technique*, and, working under somewhat adverse circumstances, has made every effort to follow up the results of the cases treated. These results have been frankly set forth to speak for themselves, and are worthy of the careful study of every ophthalmic surgeon. Can more be said?

THE OPHTHALMOSCOPE DIARY.

Midland Ophthalmological Society.	April 1st (5.30 p.m.)	Birmingham and Midland Eye Hospital.
Ophthalmological Society of the United Kingdom.	April 24th and 25th	1, Wimpole Street, London and Moorfields Hospital, E.C.
French Ophthalmological Society.	May 5th	184, Boulevard St. Germain, Paris.
American Ophthalmological Society	May 6th	Washington, D.C.
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	May 7th 8.30 p.m.	1, Wimpole Street, London.
Scottish Ophthalmological Club	May	
Ophthalmologische Gesellschaft.	May 15th	Heidelberg.
Midland Ophthalmological Society.	June 3rd 4.30 p.m.	Shrewsbury Eye Hospital.
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	June 4th 8.30 p.m.	1, Wimpole Street, London.
Oxford Ophthalmological Congress.	July 17th and 18th	Keble College, Oxford.

P
mad
O

THE OPHTHALMOSCOPE.

A MONTHLY REVIEW OF CURRENT OPHTHALMOLOGY.

VOL. XI.—No. 5.]

MAY 1, 1913.

[TWO SHILLINGS.

CONTENTS.

Original Communications.—

PAGE

1. T. S. Tirumurti, M.B., C.M.—A Case of Traumatic Multilocular
Implantation Corneal Cyst 268
2. Arthur J. Ballantyne, M.D.—Pulsation of the Retinal Arteries ... 271

Clinical Memorandum.—

- N. Bishop Harman.—A Phantom for use in the practice of Squint
Operations 285

Novelties.—

- A Near Vision Phorometer.—By Ernest E. Maddox, M.D. ... 287

Translation.—

- Guide to the Microscopic Examination of the Eye (concluded).—
By Professors Greeff, Stock, and Wintersteiner 288

Current Literature.—

- I. The Lacrymal Passages 296
- II. Albuminuric Retinitis 303
- III. Pathology (second notice) 305
- IV. Egyptian Ophthalmia 308
- V. Remedies (fourth notice) 313

Book Notices 314

Correspondence 317

The Ophthalmoscope Diary... .. 318

The Sight Tests of the Board of Trade 319

Notes and Echoes 319

ORIGINAL COMMUNICATIONS.

A CASE OF TRAUMATIC MULTILOCLAR IMPLANTATION CORNEAL CYST.*

BY

T. S. TIRUMURTI, M.B., C.M.,

ASSISTANT PROFESSOR OF PATHOLOGY, MEDICAL COLLEGE, MADRAS, INDIA.

History.

K. GOVINDI, a Hindu girl, aged 10 years, was admitted into the Government Ophthalmic Hospital, Madras, on March 20th, 1911. The patient said that three months ago her left eye was accidentally injured by the finger nail of another person who was rubbing oil round her eyes when giving her an oil inunction. The injury was followed by pain, lacrymation, and redness in the eye, and she gradually lost vision.

On Admission.

On examination, the eyeball was found to be in a condition of phthisis bulbi. On its outer half there was a cyst-like, vertically oval tumour. Anteriorly, the eye was staphylomatous. The tumour on its outer half "*looked*" as though it was covered only by the conjunctiva. The conjunctiva was moveable over the tumour, which had distinct signs of fluctuation. The tumour was not moveable over the sclerotic, but moved with the eyeball. On the lower part of it there were two sulci running obliquely downwards and outwards from the remains of the cornea for about 5 mm. in length. The tumour had a translucent look, but the upper 1/8th was bluish, probably because it was partly covered by the bulbar conjunctiva. It extended downwards almost to the inferior fornix and outwards to near the external canthus, while above it there was a clear area of congested sclerotic, where it measured 5 mm. by 6 mm. The deep conjunctival vessels were prominent over the tumour. Patient complained of pain on pressure over it. Both lids were congested. The tumour measured 19 mm. vertically and 6 mm. horizontally.

Treatment.

The eyeball was enucleated on April 1st, 1911.

It was frozen, and cut into two equal halves antero-posteriorly.

Macroscopical Appearances.

The cornea is found converted into a multilocular cyst bulging into and obliterating the anterior chamber. The lens is absent. The iris is completely adherent to the posterior wall of the cyst. The retina is detached. A mass of colloidal exudation has pushed forward the retina and ciliary body. The optic nerve is found cut very short. (Refer Microphotograph A.)

Microscopical Appearances.

There is total anterior synechia. The cornea is converted into a multilocular cyst. The deeper cysts are lined by several layers of endothelium, resembling that of Descemet's membrane. The wall of the most superficial

*Published with the permission of Col. Elliot, I.M.S., Superintendent of the Government Ophthalmic Hospital, Madras.

cyst has a fine fibrous basis and is lined posteriorly by a similar endothelium and anteriorly is covered by stratified epithelium which is in many places being shed. Three small cysts and one big one are seen. No trace of the lens is apparent in any part of the section. The retina is detached and folded up. A mass of colloidal exudation separates it from the choroid which is *in situ*. The ciliary processes are pressed forwards by the detached retina. (Refer Microphotographs B. & C.)

Remarks.

I am of opinion that the injury to the cornea resulted in the escape of the aqueous humour, extrusion of the lens, and probably to the escape of at least some of the vitreous humour. As a result of the sudden loss of support, the retina was detached all round and pressed the iris and the ciliary body forwards "*en masse*." A portion of the endothelium of Descemet's membrane was evidently implanted between the corneal fibrous lamellæ through the rent in the posterior aspect of the cornea. This piece of implanted endothelium began to proliferate later, forming the main big cyst, which as the result of great external resistance, sent prolongations between the interlamellar spaces behind to form smaller cysts, all of which communicate by narrow passages with each other. The conjunctiva covering the main cyst is in many places denuded of its superficial epithelium as a result of irritation by the lids. I am of opinion that it is a traumatic implantation multilocular corneal cyst from Descemet's membrane. This is unlike the usual implantation cysts, described by J. Herbert Parsons in his *Pathology of the Eye* (Vol. I, part I, page 253, ed. 1904), which are usually single and lined by stratified epithelium, which is irregular and ill-developed, the number of layers varying in different parts, the outer ones consisting of cubical and the inner of flattened cells.

I am much obliged to Lieut.-Col. Elliot, I.M.S., and Major H. Kirkpatrick, I.M.S., for the permission given me to make use of the clinical and pathological notes of the case for the purposes of publication and also for their valuable suggestions. I must also thank Mr. C. G. Taylor, Assistant Surgeon, Government Ophthalmic Hospital, Madras, for the microphotographs.



Microphotograph A.

- A.B.C.D. Cystic spaces.
- E. Conjunctival epithelium covering the surface.
- F. Iris adherent to posterior wall of the cyst.
- G. Detached retina.
- H. A mass of colloidal exudation on both sides of the retina.



Microphotograph B.



Microphotograph C.

- A.B.C.D. Cystic spaces.
 E. Conjunctival stratified epithelium covering the surface.
 F. Iris adherent to posterior wall of the cyst.
 G. Detached retina in the centre.
 H. Colloidal exudation
 K. Place where conjunctival epithelium is denuded.
 L. Endothelium resembling Descemet's membrane lining the interior of the cyst.
 M. Corneal fibrous lamellae.
 N. Passages by which cysts communicate with each other.

PULSATION OF THE RETINAL ARTERIES.

BY

ARTHUR J. BALLANTYNE, M.D.

SURGEON, EYE INFIRMARY, GLASGOW.

IN a well marked case of aortic insufficiency several forms of pulsation may be seen in the retinal vessels. The veins where they terminate on the disc may show a rhythmic filling and emptying (venous end pulse), and beyond the limits of the disc the larger veins may show, although this is less commonly seen, a rhythmic expansion and contraction. The arteries usually show two different forms of pulse. The first is a jerky movement of the artery (the locomotor pulse), and the second an actual expansion and contraction of the width of the vessel (the expansile pulse). If the disc itself be carefully observed one may see an alternate flushing and blanching, very similar to that seen through the finger nail or in the skin in testing for capillary pulsation (the capillary pulse).

Examine now a case of glaucoma in which the cornea is clear enough to permit a view of the fundus. One may see the branches of the central retinal artery, where they cross the disc, alternately appear and disappear, or fill and empty, with a rhythm corresponding to that of the heart's beat. The fact that this form of the arterial pulse can also be artificially produced by external pressure upon the globe, has earned for it the name of "pressure pulse."

The phenomena observed in these two cases comprise all the recognised forms of retinal pulse, arterial, capillary, and venous; but while they occur most typically in the circumstances mentioned, they have all been observed in other conditions, and the question naturally arises whether it can be shown that the presence of these pulsations has any clinical significance.

Literature.

The phenomena of the retinal pulse have been more or less under consideration ever since the introduction of the ophthalmoscope, for, although Helmholtz failed to observe them, he had looked for them in the hope that the presence of a pulse in the arteries would enable him to distinguish them from the veins.¹ The earliest observation of a pulse in any of the retinal vessels seems to have been made by Van Tricht² in 1853, and independently by Coccia³ in the same year. These two observations were concerned only with the venous pulse.

The first mention of a pulse in the retinal arteries was made by Edward Jaeger⁴ in 1854, and Quincke⁵, in 1868, was the first to describe a capillary pulse on the disc. Round these original observations a large number of more or less important papers group themselves, and there is now quite a voluminous literature on the subject. Yet it cannot be said that the phenomena have received any quite satisfactory and consistent explanation, which is not surprising when one finds that the different authors are not even at one in their descriptions of the phenomena. This paper deals only with the arterial pulse in its different forms, and with the capillary pulse.

As already stated, it was Jaeger who first established the occurrence of the arterial pulse. I have not been able to refer to his original paper, but it seems to have recorded the observation of an expansile pulse on the disc. This was three years after the introduction of the ophthalmoscope. In the same year, 1854, von Graefe⁶ described the occurrence of a spontaneous pulse of the arteries, confined to the disc, as a characteristic of well-marked cases of glaucoma. In other cases of the same disease he had discovered that the

same pulse could be induced by light pressure with the finger on the eyeball. In a further paper⁷ he described the results of experiments on the eye of the sheep, in which he had induced the same kind of arterial pulse, *viz.*, an intermittent filling and emptying of the ends of the arteries, by pressure upon the eyeball. He looked for signs of stretching or twisting of the arteries, but did not find any. He thereafter produced the pressure pulse in the normal human eye, finding, however, that greater pressure was required to bring it out than in a glaucomatous eye. His explanation was that glaucoma was caused by atheroma of the ocular vessels, and that the spontaneous arterial pulse was due to the same cause, the obstruction caused by the atheroma requiring the full force of the systolic pressure to overcome it, so that the central artery was empty between the heart beats. Digital pressure brought about the same result by obstructing the inflow of blood. Some years later von Graefe⁸ saw a spontaneous pulse, but of what kind is not stated, in the retinal arteries, in a case in which a tumour was growing from the optic nerve behind the globe. Quinke⁵ first drew attention to the presence of an arterial pulse, probably expansile, in a case of aortic insufficiency, and in the same paper he described the appearance of the capillary pulse on the disc. The same phenomena were also discussed by him in a further paper in 1870⁹, in which he stated that they occurred only in the advanced cases, and not constantly in any one case. He believed that their occurrence or non-occurrence was independent of the strength of the heart's action and the vascular tone. Becker^{10 and 11}, in 1871-72, claimed to have discovered the arterial pulse in aortic insufficiency independently of Quinke, and his papers give the results of his examination of a number of such cases. He found the spontaneous arterial pulse in all cases of aortic insufficiency not complicated by other valvular lesions, with one exception. He considered that it was more distinct the greater the hypertrophy of the left ventricle. He described both the expansion and the elongation of the arteries, and observed that they were not confined to the disc, but could be seen well out in the periphery of the fundus. He also described the forward thrust of the arterial stem on the disc, which sometimes occurs. He stated that even in healthy individuals and healthy eyes spontaneous pulsation may sometimes be seen. In his first paper he noted the occurrence of the arterial pulse in one case of retinal detachment, and in another of aortic aneurysm. It is rather remarkable that, in spite of his careful observation of the phenomena, he confessed that he had been unable to see the capillary pulse described by Quinke. In his second paper he analyses the results of his examination of seventeen cases of cardiac disease, eleven of which were cases of aortic insufficiency. Only one of the latter failed to show the pulse, and in this case the heart had been weakened by prolonged illness. The arterial pulse was also found in two cases of aortic insufficiency complicated with other lesions, and in two cases of aneurysm of the thoracic aorta. In one of the latter he thought that he was able to localise the seat of the aneurysm between the innominate and left common carotid arteries, on the ground that the pulse was better seen in the left eye, and that the left radial and retinal pulses lagged a little behind those on the right side. He agreed with Quinke that the phenomenon was not constant, even in the same individual, and found that it varied according to the "animation" of the pulse, being, for example rendered more distinct if the heart was excited by exertion. He explains the occurrence of the pulse in aortic insufficiency on the ground that the hypertrophy of the left ventricle causes a large and sudden pulse wave succeeded by a negative wave due to the incompetency of the aortic valve, the result being an abnormally large difference between the diameter of the

arteries at systole and diastole. Becker's papers give a very accurate and complete account of the phenomena, and his explanation, so far as it goes, is clear and logical, but it will be noticed that he does not assign any importance to the intra-ocular pressure. In 1873 Becker¹² contributed still further to the literature of the subject by describing the occurrence of the arterial pulse in exophthalmic goitre. Stephen Mackenzie¹³ also found the pulse in a large proportion of cases of aortic regurgitation, especially with hypertrophy of the left ventricle, and in the presence of the characteristic radial pulse. He found that its occurrence was not prevented by secondary dilatation of the mitral orifice so long as the power of the ventricle was maintained. In 1875 Jacobi¹⁴ drew attention to the fact, still unexplained, that the glaucomatous pressure pulse is confined to the disc. His explanation was that the disc, as proved by the occurrence of the glaucomatous cup, yields readily to the intra-ocular pressure, and hence the arteries are pinched as they cross the edge of the disc. He¹⁵ was the first to suggest that the expansile pulse and the intermittent inflow, or pressure pulse, were not two distinct phenomena. He based this opinion on experiments on rabbits, in which he had been able, by pressure on the globe, to produce all degrees of pulsation from mere calibre changes to complete emptying and filling, by varying the degree of pressure. He produced similar pulsation in ciliary arteries visible in a choroiditic patch. He makes the important statement that the so-called pressure pulse, hitherto only seen in glaucoma, may also occur in aortic insufficiency. He suggests that in these cases the ocular tension is absolutely or relatively high, but goes no further in his attempt to define the rôle of the ocular tension, and apparently attributes to it no influence in the production of the other forms of the arterial pulse. Pflüger¹⁶ in 1878, Becker¹⁷ in 1880, and Raehlmann¹⁸ in 1885, drew attention to the occurrence of the retinal arterial pulse in different varieties of anæmia. Raehlmann's paper is a large one and introduces some aspects of the subject which had not been dealt with by others. He recognises the two forms of the pulse, locomotor and expansile, each of which may be present without the other. The expansile pulse depends on the height of the pulse wave and the elasticity of the vessel wall. The locomotor pulse depends on the rhythmic acceleration of the blood stream, and on the resistance offered to the blood stream by the vessels, and is more marked the greater the tortuosity of the vessels. He was able to imitate the locomotor pulse in a mechanical model, and found that it was more distinct the lower the extravascular, and the higher the endovascular pressure. In the living subject he found that it was suppressed by compression of the carotid, and increased by compression of the jugular veins of the same side. The cases in which Raehlmann found the arterial pulse in the retina, about forty in number, were cases of aortic insufficiency, aortic aneurysm, neurasthenia, anæmias, exophthalmic goitre, venous stasis, and retinal vascular disease. He is not satisfied with the theory that the retinal pulse in cases of aortic regurgitation is due to the form of the pulse wave, because it is often absent in well marked cases, even with hypertrophy of the ventricles, and because in dogs in which aortic insufficiency was artificially produced, the arterial pulse did not appear until tortuosity of the arteries and dilatation of the ventricles had developed. In most of the other cases he attributes the presence of the retinal pulse to anæmia, which, in his view, is associated with oligocythæmia and hydræmia, conditions which reduce the friction of the blood stream, and allow the transmission of the pulse wave abnormally far towards the periphery. At the same time anæmia leads to increased tortuosity of the arteries, and the rhythmically accelerated blood stream, meeting the resistance offered by the

bends, tends to straighten them out—hence the locomotor pulse. The other factors he invokes are the forcible action of the dilated and hypertrophied heart, and possibly vaso-motor influences in such diseases as neurasthenia and exophthalmic goitre. He entirely ignores the intra-ocular pressure as a factor in the production of the arterial pulsations except in so far as he credits it with the effect of damping them.

Raehlmann's paper, coming as it did after the subject had been neglected for some years, gave rise to a further series of contributions. Ulrich¹⁹ pointed out that Raehlmann's theory would not explain the occurrence of the arterial pulse in the algid state of cholera (v. Graefe) or in an attack of syncope as observed by Wordsworth²⁰. The intra-ocular pressure must be taken into account. Schmall²¹ recorded his observation of the retinal arterial pulse in a large variety of conditions, including aortic insufficiency, adherent pericardium and other cardiac affections, acute pneumonia, typhoid, pleurisy, and phthisis. He frequently found the pulse, especially in its locomotor form, in anæmia, and concludes that in these cases it is associated with a low mean blood pressure and a collapsing radial pulse of full amplitude, that it is more readily visible when the retinal arteries are tortuous, and that it does not always disappear with the disappearance of anæmic symptoms. He mentions as possible factors the proportion between intra-ocular pressure and blood pressure, and the course, mode of division, and elasticity, of the arteries from which the central retinal artery arises. He does not agree with Raehlmann that the pulse has any relation to the number of fixed elements in the blood. Friedrichson²² supports Raehlmann by means of figures from a number of anæmia cases with the retinal arterial pulse, showing that there were diminution in the number of corpuscles, diminished size of corpuscles, and diminished hæmoglobin, all leading to increased mobility of the blood, and therefore to abnormally wide transmission of the pulse wave.

A paper by Thoma²³ next claims attention, as it deals with the part played by the elasticity of the arterial walls in the occurrence of the pulsations. His researches on arterio-sclerosis lead him to the conclusion that the process occurs in two stages. In the first the arteries are less elastic* than normal, and this expresses itself partly by elongation, and therefore tortuosity, of the arteries. In the second stage, that of confirmed sclerosis, the arteries are more elastic (less extensible) than normal, owing to the increase of connective tissue in their walls. The conditions of the first stage are just those favourable to the appearance of the arterial pulse, both locomotor and expansile, namely, laxity and tortuosity, and hence Thoma holds that the onset of tortuosity of the arteries, combined with the occurrence of pulsation, may be evidence of the early stage of sclerosis, while the observation of similar vessels without pulsation points to the second stage of sclerosis. Thoma's speculations at least remind us that the state of the vessel wall must play a part in determining the presence of the visible pulse. Raehlmann²⁴ in a further paper again insisted that the ordinary expansile pulse had no relation to the pressure pulse and did not depend in any way on the intra-ocular pressure, but was entirely due to a pulse wave of abnormal height propagated abnormally far to the periphery of the circulation. In discussing the locomotor pulse he describes it as an expression of the systolic expansion of the arterial wall in its long axis, which he attributes chiefly to the pressure wave, but also to the impact of the blood stream against the bends at each systolic acceleration. This phenomenon also he believes to

*Thoma seems to use the term elasticity somewhat loosely as equivalent to rigidity, so that diminished elasticity means increased laxity. This is just as inaccurate as the more common use of the term elastic for vessels which are more lax than normal.

occur only when, for some reason, the pulse wave has been transmitted abnormally far, but while denying the intra-ocular pressure any influence in the production of the expansile pulse, he states that the locomotor pulse occurs more readily when the systolic blood pressure exceeds the intra-ocular pressure. Quincke, the discoverer of the capillary pulse, made a further contribution in 1890²⁵ in which he states that the conditions favourable to the appearance of the capillary pulse are: (1) a large difference between the systolic and diastolic blood pressures; and (2) external (extravascular) pressure equal in amount to the diastolic blood pressure in the retinal arteries. In this paper Quincke also notes the occurrence of the capillary pulse on the disc in some anæmic patients, as well as in aortic regurgitation.

Description of the Phenomena.

The pulsations seen in the retinal arteries fall to be considered under four heads: (1) The locomotor pulse; (2) The expansile pulse; (3) the capillary pulse, sometimes found in association with those two and therefore described in this connection, and (4) the pressure pulse, collapsing pulse, or intermittent inflow.

The Locomotor Pulse.

The locomotor pulse consists of a rhythmic displacement of the artery almost synchronus with the cardiac systole, and may be looked for in three different situations: (a) in the artery and its branches on the disc, (b) in the branches as they pass across the fundus, and (c) at points where bifurcation of a retinal artery occurs.*

In the first of these situations the pulse may be confined to individual branches, and have the form described under (b), but in other cases the central artery and its primary branches are thrust forward *en bloc* with each systole of the heart. The simple forward thrust may be combined with a twisting or rotary movement, which apparently depends on the form and direction of the branches. The locomotor pulse on the disc, when present, is quite a striking phenomenon, partly owing to the number of arteries visible at one time in a small area, partly because any movement of the vessels is easily observed against the pale background of the disc.

In the second situation mentioned, namely, in the course of the arteries across the fundus, the pulse is to be looked for wherever an artery makes a bend, especially an abrupt bend. The displacement is invariably a movement of this part of the vessel in the direction of the convexity of the curve. It is still more easily seen where two successive curves give the form of the letter S. The movement of each curve being in the direction of its convexity, we have two simultaneous and opposite movements which are readily perceived.

Thirdly, at the points where bifurcation occurs it is sometimes possible to make out that this part of the vessel is propelled forward at each cardiac systole, in the direction of the blood stream. This movement differs from the thrusting movement seen on the disc only in this, that in the latter the motion is towards the observer, in the former it is in the retinal plane. The movement at a bifurcation is by no means easy to see, perhaps because there is no fixed point to which to refer the movement. It has been described by Becker¹¹ and others, and I have been able to see it in a few cases.

Of these three forms of the locomotor pulse, by far the most frequently observed is the second. In all three forms the movement consists of a sudden

*In one of my cases both the locomotor and expansile pulses were seen in an undoubted cilio-retinal artery.

displacement, followed by a less sudden return to the original position. It agrees further with the radial and other arterial pulses in having an interval before each systolic beat corresponding to the long pause of the cardiac cycle. One has even been able to see occasionally an interruption of the diastolic recoil, corresponding to the dicrotic wave felt at the wrist, and where the action of the heart is irregular or intermittent the irregularities of force and rhythm are reproduced in the retinal pulse. This was illustrated in a case of endo- and peri-cardial disease in which the following conditions were found.—The patient sat up in bed in order to be examined. At the beginning of the examination the heart rate, on auscultation, was 78 per minute, each alternate systole being only faintly heard. The pulse rate at the wrist was only half of that of the audible heart beats, and the same was true of the retinal arterial pulse; that is to say, the weak systoles were not able to send a wave which could be felt at the wrist or seen in the retina. After a short interval, perhaps from the excitement of the examination, the heart beat became more forcible, and the pulse rate, both in the radial and in the retinal arteries, rose to 78, the alternate pulsations, however, still showing relative weakness. Many examples could be given of intermission of the heart beats manifested by intermission of the retinal pulse. In one of these there was an occasional dropped beat, and at these times there was a momentary complete emptying of one or two arterial branches on the disc, refilling occurring with the next cardiac systole. In another the cardiac intermission was due to syncope, which occurred during ophthalmoscopic examination. The same temporary emptying of the arteries on the disc was observed.

The locomotor pulse being most readily seen in the curved portions of the arteries, it is usually to be looked for near the disc, since as a rule the arteries assume a straighter course at the periphery of the fundus. If a finger is kept on the apex beat while the retinal arterial pulse is being observed, it will be found that there is an appreciable interval between each heart beat and the corresponding retinal pulse, an interval which depends on the rate of transmission of the pulse wave. As a rule the interval between the apex beat and retinal pulse amounts to about a fifth of the cardiac cycle, that is, a fifth to a seventh of a second. Under certain conditions it may be as much as a half of the cycle, that is to say the apex beat and the retinal arterial pulse exactly alternate. But whatever the state of the heart and circulation may be, there is no appreciable interval between the *radial* pulse and the retinal pulse. In other words, the pulse wave takes the same time to travel from heart to retinal artery, as from heart to radial artery. Among a large number of observations, I have found only one exception to this rule, a case of aortic valve disease, in which the retinal pulse was appreciably later than the radial pulse. It may be taken as the rule that the radial pulse and the retinal arterial pulse are synchronous.

The Expansile Pulse.

The expansile pulse is seen as a broadening of the blood column and of the central light streak. Perhaps the latter is the more readily appreciated. While the locomotor pulse can only be seen where there are curves of suitable amplitude, and is therefore to be looked for in the neighbourhood of the disc, the expansile pulse can be seen at least equally well in the straightest arteries, and is therefore often found in the finer and straighter branches well out in the fundus. Sometimes the locomotor pulse alone is seen on and near the disc, and the expansile pulse alone in the periphery of the fundus. This

difference is so pronounced in some cases that one is tempted to think that the two kinds of pulse are to some extent mutually exclusive. Thus, in a case of aortic regurgitation it was found that in the right eye the locomotor pulse was very distinct on the disc and in the curves near the disc, the expansile pulse being faint in these situations, while further out in the fundus, where the arteries were straighter, the locomotor pulse was difficult to detect, but the expansile pulse very distinct. In the left eye the main branches of the artery on and near the disc were much less mobile than in the right eye, but showed the expansile pulse very distinctly.

It has been mentioned that rhythmic displacement is sometimes to be made out at a point of bifurcation. Becker¹⁰ and ¹¹ and Schmall²¹ go further and say that the *expansile* pulse is better seen before a point of bifurcation, but I have been unable to confirm their statement.

Like the locomotor pulse, the expansile pulse shows a more sudden phase (expansion), followed by a less sudden contraction, and then a pause; three phases corresponding respectively to the systole, diastole, and long pause, of the heart. Irregularities and intermissions of the heart's action are also reproduced in similar variations of the expansile pulse.

The Capillary Pulse.

The capillary pulse needs little description. When present it is confined entirely to the disc. It has never been detected in the general eye ground. If the whole surface of the disc is of uniform tint, the pulse takes the form of a rhythmic deepening and lightening of the tint. If, on the other hand, the disc has one part more and another part less vascular, the pulse is seen as a rhythmic extension of the more vascular area, as one sees it under the nail, in the familiar clinical test. The flushing of the disc accompanies the cardiac systole, and blanching accompanies the diastole. The systolic phase is the more sudden, and the diastolic is followed by a pause. The capillary pulse seems to be absolutely synchronous with the arterial pulse and with the radial pulse.

The Pressure Pulse.

The spontaneous occurrence of this pulse, with a few exceptions to be afterwards referred to, is observed only in glaucoma. Von Graefe, who was the first to describe it, observed that it could be artificially produced by pressure upon the eyeball, and he also discovered that the pulse was not always present in glaucoma, but that if it were absent in that disease it could be induced by relatively light pressure on the globe. It owes its common name of "pressure pulse" to the fact that it is brought about by high intra-ocular pressure, but the terms "collapsing pulse" and "intermittent inflow" have more descriptive value.

This phenomenon consists in alternate filling and emptying of the central ends of the branches of the central retinal artery, and it apparently never extends outside the limits of the disc. The filling is synchronous with the rise of the radial pulse, and the emptying with its fall, and the changes are so sudden that it is difficult or impossible to make out the direction of the blood stream as it enters or leaves the vessel. The filling is rather more sudden than the emptying, and the period during which the vessel is empty is longer than that during which it is full, a fact which obviously relates the empty state to the long pause of the cardiac cycle. Since the walls of the arteries are invisible and we see only the blood column, the pressure pulse actually presents the appearance of a column of blood flashing suddenly into and out of sight.

Explanation of the Phenomena.

It has been found that a pulse is visible in the retinal veins in a large majority of healthy subjects, but a much smaller number of the same persons present a visible pulse in the retinal arteries. In my own observations 36 per cent. of healthy persons showed some form of arterial pulse in the retina. Haab²⁶ says that in healthy individuals, if one of the larger arteries in the region of the papilla is distinctly curved, we can always see a movement of pulsation. One would scarcely be justified in speaking of a phenomenon which occurs in about a third of healthy individuals, as "physiological," and yet the arterial pulse is physiological in the same sense as the venous pulse is, namely, that it is a common occurrence in healthy individuals and in healthy eyes.

In order that a pulse should be visible in any vessel, it is necessary (1) that the blood pressure in the vessel should be affected by the pulse wave, and (2) that this should cause a rhythmic expansion and contraction of the vessel, of sufficient amplitude to be visible. How do we account for the absence of a visible pulse in the retinal arteries in such a large proportion of normal cases? Is it because the pulse wave does not reach these arteries, or is a pulse wave present but not of sufficient strength to cause a visible expansion of the vessel? We cannot obtain a direct answer to these questions, since that would require microscopical observation of the blood stream, or manometric measurements of blood pressure, in the retinal arteries. The observations of Priestly Smith²⁷, Schulten²⁸ and others, that intra-ocular pressure varies with systole and diastole of the heart, and the fact that the tonometer shows pulsatile variations of ocular tension, are suggestive of, but do not prove, the existence of expansile pulsation of the retinal arteries; but there are strong reasons for believing that the physiological venous pulse is a pulse transmitted through the capillaries from the retinal arteries, and if we accept that view we must assume the existence of a pulse wave in the retinal arteries, but not necessarily one which manifests itself as an actual expansion and contraction of the arteries. Secondly, the presence of a pulse wave in the retinal arteries under normal conditions is rendered highly probable by the fact that we can always elicit the so-called pressure pulse in the retinal arteries by exercising sufficient pressure on the eyeball. Again, the presence of the arterial pulse in even a third of normal persons makes it probable that there is normally a pulse wave in the retinal arteries, which under certain conditions becomes visible. Tortuosity of the course of the arteries is apparently one of these conditions, since it favours the occurrence of the locomotor pulse. Lastly, rhythmic change of velocity of the retinal blood stream has been observed entoptically³¹.

The statement is often made that the pulse wave does not reach such small arteries as those of the retina. This may be true of arteries of similar size in other parts of the body, but the retinal arteries are under peculiar conditions. It has been shown by Roy and Brown²⁹ and by Türeck³⁰ that a certain degree of obstruction to the venous outflow from a part causes the pulse to be transmitted from the larger arteries into the arterioles, capillaries, and veins. Pulsation in small arteries is also rendered more visible by the application of a certain degree of pressure to the outside of the vessels. These two conditions are provided in the eye, by the pinching of the ends of the veins, on the one hand, and the support given by the intraocular pressure to the walls of the retinal arteries, on the other, and thus the occurrence of a visible pulse is rendered more probable in the retinal arteries than in arteries of a similar size in other parts of the body.

We are probably justified in believing that normally a pulse wave does pass through the retinal arteries, that in a considerable number of cases, at least 36 per cent., it manifests itself as the locomotor pulse, in a few cases (3 per cent.) as the expansile pulse, and that in all other cases it exists simply as a variation of pressure and velocity of which we have no direct evidence. Why then does this pulse wave not always cause a visible expansion? It seems quite a sufficient answer to suppose that the force and amplitude of the wave are not great enough, in relation to the rigidity of the vessel wall, to produce a visible movement. The only other answer which demands attention is one stated by Raehlmann¹⁸ and since repeated in many papers and text books, that the intraocular pressure damps the pulsations of the retinal arteries. This can be shown to be inconsistent with the phenomena of the arterial pulse both in the eye and elsewhere. Raehlmann himself¹⁸ demonstrated, on a model, an increase of pulsation by obstructing the outflow tube, and this accords with the fact demonstrated by Roy and Brown that obstruction or increased resistance in the veins increases the amplitude of the pulse in the corresponding arteries. Now the intraocular pressure impedes the outflow from the retinal veins by constricting them at their points of exit on the disc, and thus even the normal intraocular pressure tends to increase, rather than to damp, the pulse wave in the retinal arteries. This mechanical effect of the normal intraocular pressure is, indeed, one of the factors essential to the occurrence of any form of the retinal pulse. Moreover, it is a familiar fact that if gradually increasing pressure be applied to an artery from without, as by the button of the sphygmograph on the radial artery, a point is reached at which the oscillation of the vessel wall is at its maximum, and at this point the applied pressure is, according to most authorities, equal to the minimum blood pressure in the vessel. If pressure is increased beyond that the oscillations diminish, but the pulse is only quite abolished when the pressure from without is equal to the maximum pressure within the vessel. Again, in the application of the Riva-Rocci sphygmomanometer, increasing pressure from without at first increases the amplitude of the arterial expansion and contraction. When this reaches its maximum the extravascular pressure is said to be equal to the diastolic pressure in the artery. When pressure in the armlet is raised still higher the pulse wave in the artery is blocked, and extravascular pressure is then said to be equal to systolic pressure in the artery. Now, if we increase ocular tension by pressure on the globe, we produce first expansile pulsation of the retinal arteries, if none were present before, and with a slightly greater degree of pressure we elicit the intermittent inflow, or pressure pulse (maximum amplitude of pulsation), while with a still higher pressure we abolish all rhythmic inflow of blood. We see therefore that ocular tension is normally below that necessary to induce maximum oscillation of the arterial wall, and *a fortiori* much below that necessary to damp the oscillations. The phenomena of the Riva-Rocci manometer are a much more helpful analogy to what occurs in the eye than the results of simple obstruction of the outflow referred to by Raehlmann, Türck, and the others, for in the eye, as in the Riva-Rocci instrument, we cannot disentangle the effects of pressure on the vein from the effects of pressure on the outside of the artery itself. However we regard the matter it is obviously incorrect to say that the intra-ocular pressure damps pulsations which would otherwise be visible in the retinal arteries.

Since the four forms of the retinal pulse are clinically distinct, they have usually been separately described, as if they were almost unrelated phenomena, but it is worth while to turn our attention to the features which are common to them all, and to the common mechanical basis on which they all rest. Two factors lie at the back of all these forms of the retinal arterial

pulse, *viz.*, (1) The blood pressure in the retinal arteries, and, (2) The intraocular pressure. There are other factors, such as the elasticity, etc., of the arteries, but these are of secondary importance. The intraocular pressure is held by most authorities to be a function of the blood pressure in the ophthalmic artery, and we may assume that the ratio between intraocular pressure and mean blood pressure in the retinal arteries, will be fairly constant under all physiological conditions. We know, however, that (*a*) the 'pulse pressure' (the difference between minimum and maximum blood pressure) is not constant even in physiological states of the circulation, (*b*) pathologically, *e.g.*, in aortic regurgitation, the pulse pressure may be greatly increased, even while mean blood pressure and intraocular pressure remain normal, (*c*) in other pathological states, *e.g.*, glaucoma, the normal relationship between blood pressure and intraocular pressure is upset by a relative increase of the latter, and, (*d*) when, for some temporary reason, the blood pressure in the central retinal artery is greatly lowered, *e.g.*, syncope, the intraocular pressure is, for the time being, relatively high.

These are some of the variations and combinations of the primary factors, which go far to explain the occurrence of the different forms of the retinal arterial pulse.

Mechanism of the Locomotor Pulse.

At each contraction of the left ventricle, a certain amount of blood is driven into the arteries. This causes two things: acceleration of the blood stream, and an expansion of the arteries whereby the excess of blood is temporarily accommodated, to be passed on during cardiac diastole by the more gradual contraction of the arteries. We are accustomed to think of this expansion of the artery as occurring only in its transverse axis, but expansion occurs also in the long axis of the vessel, and it is this which constitutes the locomotor pulse. Ludwig and others have pointed out that in an exposed vessel pulsatile elongation will be seen when enlargement of diameter is invisible, and this will no doubt explain to some extent why the locomotor pulse is so much more frequently and more easily seen than the expansile pulse. Although for purposes of description it was convenient to speak of the locomotor pulse as a "displacement" of the artery in a certain direction, what really occurs is an elongation of the artery. If we suppose a curved portion of an artery to become elongated, the result will be an increase in the amplitude of the curve and a displacement of the summit of the curve in the direction of the convexity. Naturally, a movement at right angles to the course of the vessel is readily seen, much more so than expansion and contraction of calibre in such small vessels. The same phenomenon may be seen occasionally in other parts of the body, wherever a tortuous artery is so superficial as to be clearly traceable. It occurs most often in the case of the temporal artery, but may be seen at times in the radial or brachial. Expansion of the artery in its long axis also accounts for the two other forms of the retinal locomotor pulse, namely, the movement seen occasionally at the point of bifurcation of an artery, and the thrusting movement of the central artery and its main branches at their emergence on the disc.

Rachlmann and his pupils hold that the locomotor pulse is more dependent on rhythmic acceleration of the blood stream than on the pressure wave, the idea being that the impact of the accelerated stream on the bends causes the displacement of the vessel. One may admit the probable influence of this factor in some forms of the locomotor pulse. The tendency of such an impact of the stream will be to straighten out the vessel, and we can understand that

where an artery divides, either on the disc or in its course across the fundus, the effect of this may be shown in a locomotor pulse in these situations. To what extent this variety of the locomotor pulse is dependent on the acceleration of the stream, and to what extent on the wave of increased pressure, it is impossible to say. In theory, and on the basis of experiments, both factors are effective. Nor is the point important, since the conditions of the circulation favourable to a marked velocity pulse are those also favourable to a marked pressure pulse; or, in other words, pulse pressure varies directly with the acceleration of blood flow produced by each pulse wave.³² The case is different, however, in the more commonly observed form of locomotor pulse in the curved portions of the arteries. The tendency of sudden acceleration of the blood stream is to straighten out the vessel. In the form of pulse we are now considering what happens is the opposite of this, namely, an exaggeration of the curves. This can only be due to the elongation of the vessel which results from the systolic rise of blood pressure. The truth of this statement is illustrated by the following observation. In a thin, elderly man, in whom all the superficial arteries were markedly tortuous, the brachial artery could be distinctly seen coursing down the inner side of the arm, and its well-marked curves presented the locomotor pulse of the kind we are discussing. Compression of the distal end of the artery sufficient to completely obstruct it, instead of diminishing, caused a distinct exaggeration of the locomotor pulse. Since obliteration of the vessel prevented any passage of blood through it, the acceleration of the stream could not play any part in the production of the locomotor pulse. This must have been due entirely to the blood pressure variation.

Having considered the locomotor pulse as an expression of the rhythmic variation of blood pressure, we have next to ask whether it is influenced in any way by the state of the intra-ocular pressure. It has already been shown that the normal intra-ocular pressure, by impeding the venous outflow from the retina, tends to level up the arterial and venous pressures, and favours the occurrence of the arterial pulse, so that it cannot be left out of account in discussing the mechanism of the locomotor, or, indeed, of any form of the arterial pulse in the retina. When we ask whether pathological variations of the intra-ocular pressure have any bearing on the occurrence of the locomotor pulse, there is, unfortunately, no clinical evidence on which a dogmatic answer can be based. There are no available figures to prove a greater frequency of the locomotor pulse in cases of very high or of very low ocular tension. We are, therefore, compelled to reason from theoretical considerations and from the results of experiments. Raehlmann devised an experiment¹⁸ in which he was able to produce locomotor pulsation in a tortuous rubber tube passing through water in a closed vessel. He found that increase of the 'extra-vascular' pressure diminished the strength of the locomotor pulse. But this result is of little value, for the apparatus used did not in any real sense reproduce the conditions of the ocular circulation. Indeed, experiments of this kind can only illustrate what the observer believes to occur. We ought to be on safer ground in noting the results of increased ocular tension such as can be produced artificially by finger pressure. Can such pressure produce the locomotor pulse where it is absent, or increase, diminish, or abolish a locomotor pulse already present? Graefe⁷ looked for the occurrence of the locomotor pulse in his pressure experiments, but did not find it. Czermak³³, on the other hand, claimed to have observed exaggeration of the locomotor pulse under finger pressure. I have tried this experiment in a number of cases, but the results are inconclusive. It is certainly very difficult, if not impossible, to produce the locomotor

pulse in this way, or to produce a change of any kind in one already present. In most cases I have simply noted that no change could be observed, in two cases I have suspected a diminution, while in one case only have I fancied that I had produced a locomotor pulse where it was absent. So far as the experiments go they tend to confirm Raehlmann's statement that increased extravascular pressure diminishes the locomotor pulse. It has already been explained that anything which impedes the outflow of blood through the veins increases the height of the pulse wave in the arteries, and since pressure on the eye, so as to raise the intra-ocular pressure, narrows the calibre of the retinal veins at their exit, one would expect increased intra-ocular pressure to produce or accentuate the locomotor pulse. In Raehlmann's model pinching of the outflow tube caused accentuation of the locomotor pulse. In view, however, of the uncertain results of pressure experiments in the human eye, and the absence of clinical evidence of variation of the locomotor pulse in cases with marked variations of ocular tension, we must admit that there is no obvious relationship between the locomotor pulse and pathological changes in intraocular pressure, and that the locomotor pulse, as a pathological phenomenon, appears to depend almost wholly on an abnormality of the form of the pulse wave which enters the retinal artery.

Mechanism of the Expansile Pulse.

It is agreed that the expansile pulse is an expression of the systolic and diastolic rise and fall of blood pressure in the retinal arteries. At an earlier stage we saw that there is probably a pulse wave in the retinal arteries under physiological conditions, and discussed the reasons for the absence of an expansile pulse in the majority of normal individuals. We have now to consider the influence which the ocular tension and the blood pressure respectively have upon the occurrence of the expansile pulse.

It has often been stated that the occurrence of a visible pulse in the retina is caused by low blood pressure. This is an imperfect and partial statement and does not bring out the essential facts of the case. It is true that the visible retinal pulse is often associated with low blood pressure, but it is not always so, and it is not even sufficient to say that the pulse depends on the ratio between intraocular pressure and blood pressure, if by the latter we refer to mean blood pressure, for the ratio between mean blood pressure and ocular tension is fairly constant, and the factor which is most open to variation is the ratio between systolic and diastolic blood pressure. Under normal conditions the pressure wave entering the retinal arteries is so low that in many cases it produces either no expansile pulse or one so minute as to be invisible. But any increase of the amplitude of the wave obviously tends to render the expansion of the artery visible, from the consequent increase in the excursion of the vessel wall. It is here that low blood pressure plays its part, for low blood pressure as a rule is accompanied by laxity of the vessels which are under the control of the vasomotor nerves, and this in turn favours the propagation of the pulse wave to the smaller peripheral vessels. Hence the pulse wave which enters the retinal arteries is of abnormal amplitude, and this character of the pulse wave will be found to be common to all the clinical conditions in which a marked expansile pulse is found. Moreover the retinal arteries are subject to the law that a certain pulse pressure gives a more perceptible expansion of calibre with a low tension than with a high tension. These two facts explain the frequent association of low blood pressure with the expansile pulse, but low blood pressure is not in itself sufficient to cause the pulse to appear. Whatever

may be the value of mean blood pressure, anything which causes a high pulse pressure will favour the appearance of the expansile retinal pulse.

As regards the influence of the intra-ocular pressure on the expansile pulse, even the normal intraocular pressure tends to favour the appearance of the pulse, (1) by impeding the outflow of blood from the veins, and, (2) by the support which it gives to the walls of the arteries themselves. These points were referred to in an earlier part of this paper. Both of them are, of course, exaggerated to a greater or less extent in the glaucomatous eye. One would therefore look for the occurrence of the expansile pulse in glaucoma, and yet it is not characteristic of this disease. It is not every case of glaucoma in which the conditions are such as to allow a critical examination of the vessels, but I have seen a pronounced expansile pulse of the arteries in one case of glaucoma, in which the more commonly described and more easily seen collapsing pulse was absent. Moreover, although most writers in describing the effects of digital pressure on the eye, deny that the expansile pulse can be produced, its occurrence in such experiments was described by Jacobi¹⁵ and I can confirm his statement from repeated observations. It cannot be denied, then, that intra-ocular pressure is a necessary factor in the occurrence of the expansile pulse, even when it is normal, or that elevation of the intra-ocular pressure is capable of producing the expansile pulse in the retinal arteries of healthy eyes, but it is equally true that the expansile pulse as commonly observed, and in its most striking form, occurs in cases where the ocular tension bears the normal relation to mean blood pressure, but in which there is an abnormally large interval between systolic and diastolic blood pressure. This is undoubtedly *the* outstanding factor in the mechanism of the expansile pulse in the retinal arteries. In looking for an explanation of the expansile pulse, we have therefore to consider the relation between three things, namely, the intra-ocular pressure, and systolic and diastolic pressure in the retinal arteries.

According to Henderson and Starling³⁴ intra-ocular pressure depends on, and varies directly with, the blood pressure in the ciliary arteries. This does not of course mean that intra-ocular pressure rises and falls, millimetre for millimetre, with the blood pressure, but that rise or fall of the one is accompanied by a proportionate movement of the other. But even this can only be true within limits, for actual comparative measurements of blood pressure and intra-ocular pressure show that the excessively high blood pressures of renal disease, or the excessively low pressures found in some other conditions, do not produce intra-ocular pressures outside the physiological limits of, say, 15 to 30 mm. of mercury. It may be assumed, however, that within certain limits intra-ocular pressure varies along with the mean blood pressure, and will have a fairly constant relation to the pressure in the retinal arteries and veins. As to the actual values of the pressures we are considering, thanks to the extending use of the tonometer in clinical work, the physiological limits of the intra-ocular pressure are now fairly well established, and it may be said that the latter averages 20 mm. Hg., and that any measurement below 13 or above 27 is pathological. No direct measurements of the systolic and diastolic blood pressures in the retinal vessels can be given, and we can therefore only speculate concerning them. Intra-ocular pressure must be lower than diastolic pressure in the retinal arteries, since it takes a fair amount of pressure with the finger to cause intermittent emptying of the ends of the arteries, and it must be only a little lower than blood pressure in the retinal veins, since very slight pressure with the finger is required to empty the vein ends. If we take a hypothetical case in which the intra-ocular pressure is 20 mm. Hg., we

may suppose that the blood pressure in the retinal veins is only a millimetre or two higher, but it is not easy to say how much higher that in the retinal arteries might be. Different authorities differ greatly in their estimate of blood pressure even in such a vessel as the carotid, and in their opinion as to the probable fall in pressure in passing from the larger to the smaller vessels, such as the ophthalmic artery, but from comparison of a number of statements I take 30 mm. Hg. as a *possible* figure for mean blood pressure in the central artery of the retina. Without claiming anything like exactitude for this figure, I may use it along with those assumed for intra-ocular and intravenous pressure, to illustrate what I conceive to be the mechanism of the expansile pulse. This mechanism can be best understood by considering what happens when we employ the Riva-Rocci hæmodynamometer. By inflating the air cushion applied round the arm, the pressure on the outside of the brachial artery is raised until the maximum oscillation of the mercury column, and therefore of the vessel wall, is produced. At this point the extravascular pressure is said to be equal to the diastolic pressure in the artery. Applying this to the case of the eye, the intra-ocular pressure corresponds to the pressure in the air cushion, a certain increase of intra-ocular pressure by the finger will, in favourable cases, produce an expansile pulsation of the retinal arteries, while a still greater pressure will produce the collapsing pulse, which corresponds to the point of maximum oscillation of the vessel wall, and indicates that intra-ocular pressure is now equal to the diastolic pressure in the retinal arteries.

Taking the figures above mentioned, let us assume that in a normal individual an intra-ocular pressure of 20 mm. is accompanied by a mean blood pressure in the retinal artery of 30 mm. The "pulse pressure" in the central artery will not be high; assume that blood pressure oscillates between 28 mm. and 32 mm. The intra-ocular pressure is then so much below diastolic pressure in the artery that the oscillation of the wall is slight and may be invisible. If now some change occurs in our hypothetical conditions by which intra-ocular pressure is approximated to diastolic pressure in the artery, we shall have reproduced in the eye what occurs in the application of the hæmodynamometer, namely, the relation of extra- and endo-vascular pressure will be such as to cause a distinct oscillation of the arterial wall. This state of affairs may be brought about in the eye, either (1) by raising intra-ocular pressure to meet the diastolic endo-vascular pressure, or (2) by bringing down the diastolic pressure to meet the intra-ocular pressure. The first case represents the state of affairs in glaucoma, in which intra-ocular pressure rises independently of retinal blood pressure, until it may readily reach a point near to the diastolic pressure in the artery. It is also the condition produced temporarily by pressure with the finger just short of that needed to produce the collapsing pulse. It can be readily understood that in either of these cases if the 'pulse pressure' in the central artery is small, even such an approximation of the pressures may be unable to elicit a visible expansile pulse. This will explain why the expansile pulse is seldom seen in glaucoma, and not easy to observe in the finger pressure experiment. Consider now the second case referred to above. Since intra-ocular pressure bears a fairly constant ratio to the mean arterial pressure, then if the former remains normal the approximation of intra-ocular pressure and diastolic pressure in the artery will necessitate an increase of pulse pressure, that is an increase of the interval between systolic and diastolic pressure in the artery. It will be observed that this is what occurs in cases where the expansile pulse is most typically seen, namely, in cases of aortic regurgitation, in which a high pulse wave is found even in the finest divisions of the arteries. With intra-ocular pressure at 20 mm. Hg., and mean endo-

vascular pressure at 30 mm., diastolic and systolic pressures might well be 25 and 35 mm. respectively, as compared with the 28 and 32 mm. already assumed for a normal case. We now have two conditions fulfilled which are necessary for the production of an expansile pulse: (a) extravascular pressure nearly equal to diastolic endovascular pressure, and, (b) a high range of pressure inside the artery. A little further increase in the pulse pressure, so as to bring the diastolic pressure down to 20 mm., would equalise diastolic pressure and intra-ocular pressure, with the result that there would be maximum oscillation of the arterial wall, seen ophthalmoscopically as a collapsing pulse of the artery. The latter I have actually seen in one case of aortic regurgitation, and the same result can be produced temporarily in any case of aortic regurgitation with well marked expansile pulse, by very slight finger pressure on the globe, which, as we have seen, temporarily brings up intra-ocular pressure to meet diastolic pressure in the artery.

(To be concluded.)

MEMORANDUM.

A PHANTOM FOR USE IN THE PRACTICE OF SQUINT OPERATIONS.

BY

N. BISHOP HARMAN,

LONDON, ENGLAND.

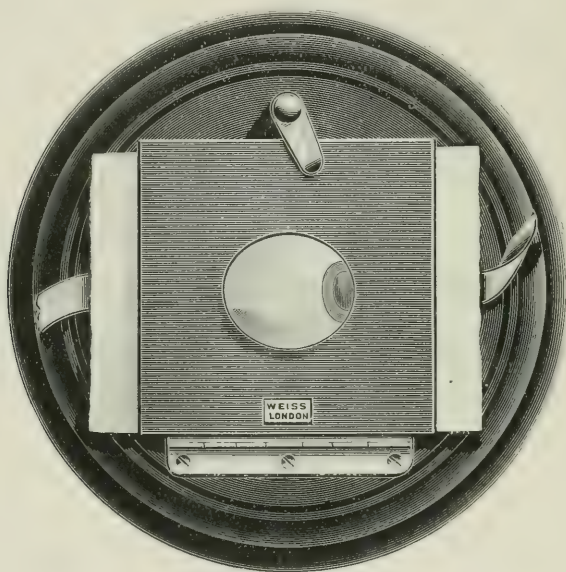
THE provision of satisfactory material for the teaching and practice of squint operations amongst students is by no means an easy matter. The ocular muscles and Tenon's capsule of the domestic animals are not the same as in man. The tendons of the recti are different in strength and length, and the capsule is thicker and tougher. These differences alone would make the operations more difficult than they are in real life. But the matter is further complicated in the animals by the presence of a deep collar of bone around the orbital margin, which makes the approach to the tendon, and operation thereon, difficult beyond what they should be.

At the West London Post-Graduate College, I am accustomed to use the heads of freshly killed sheep. The heads are split in two. The wool is clipped and the skin shaven so as to leave an eyebrow. Then the whole flap of tissue above the upper lid is reflected *en masse* from the bone until the orbital margin is exposed. The bony collar of the margin is removed by a few bites with powerful bone forceps, the flap of skin is then replaced. So prepared, the various squint operations may be performed with more satisfaction. Nevertheless, the student seems too much employed with the difficulties of the tissues to fix his whole attention on the steps of the operation.

At one time I tried to secure the heads of dogs for my class. Application was made for the supply of the heads of the dead animals to a "Home," where many animals were destroyed. But the reply was—they could not entertain the proposition as it would be repugnant to the feelings of their subscribers!

At the meeting of the Oxford Ophthalmological Congress last year, I made use of a rough home-made phantom wherewith to demonstrate the steps of my new subconjunctival reefing and advancement operation, and

I have since had these phantoms in use at my classes, where they have given great satisfaction. The phantom does not pretend to supply tissues like the human eye, but it does supply a "globe," "lids," "tendons," and "conjunctiva," so related to each other that the steps of any squint operation can be gone through with clearness and certainty. And when the operation has been done, the phantom can be opened and the underside of the "tendon" exposed so that the results of the performance can be viewed from another aspect.



The phantom consists of a wooden bed plate. In the centre is a hole to receive the "globe," which is a sphere of cork covered with dommette. The "lids," are formed of a piece of wood hinged on to the bed plate. For practice, a piece of 7 mm. wide ribbon is laid across the globe, so as to represent the tendon and its antagonist; this is covered by a square of fine cloth—nainsook or closely woven Japanese silk is quite satisfactory. The ribbon should be coloured, so as just to show through the white overlying stuff. The lid-flap is shut down and fixed with the clip. A "cornea" is made by sticking a drawing-pin in the desired position or by marking the stuff with a pencil. The phantom is ready.

One advantage of the phantom over the sheep's head is that the desired operation can be done over and over again until the *technique* is mastered, and then the sheep's head is used for the final test with all the difficulties of the tissues.

The phantom is made by Messrs. Weiss, of Oxford Street, London.

NOVELTIES.

A NEAR PHOROMETER,

BY

ERNEST E. MADDOX, M.D.,

BOURNEMOUTH, ENGLAND.

THIS appliance is a simple application of Snellen's "Friend" test, and consists of a row of translucent green figures crossed through its middle by another row at right angles consisting of a line of translucent red dots. Both figures and dots are punched out of a thin opaque disc, on holding which up to the light, with Snellen's spectacles on, the eyes are dissociated, since one eye sees the red dots, and the other the green figures. If the red dots be held horizontal, the figure which they cross reveals the hyperphoria, if held vertical it reads off the horizontal balance.

In my original plan the sheet was to be rectangular, capable of reinsertion in a frame with either of two adjacent sides uppermost, but the manufacturers, Messrs. Raphael, suggested the disc form as more convenient. To prevent any possibility of the patient mistaking between right hand and left, the figures run from 1 to 40 right across. The real zero is 20. The red glass of the spectacles should be worn before the right eye: then if the figure selected by the red dots exceed twenty the excess is the esophoria, to be entered as positive: if less than twenty, the deficit is to be entered as a minus quantity, measuring the divergence. In short, having added twenty to zero we must deduct it from the figure obtained in every case. Thus $23 - 20 = 3$. That is three of convergence. But $16 - 20 = 4$. That is 4 of divergence.



It is convenient to treat right hyperphoria as positive, and left as negative, and use the disc so that the figures are in descending order. The relation between the figures and the frame is such that they represent tangent centunes (prism dioptres) at the distance of the eyes. Thus the figure read off, divided by the dioptres of the lens worn, describes how much that lens must be decentred in centimetres to annul the deviation, according to Mr. Prentice's admirable metric principle. Knowing this, the surgeon can correct any fraction he thinks best.

To give an example.—A presbyope with reading glasses of 3D, and hyperphoria of 1·5, would have the latter fully corrected by decentering a single lens ·5 cm. since $1\frac{5}{3} = \frac{5}{3}$. Dividing this between the two eyes would give ·25 (=2·5 mm.) for each lens, one down the other up. In practice, probably 2 mm. would be enough for each lens.

The only difficulty with this appliance is that of always obtaining a sufficiently good sky-light. For this reason the eyepieces are best glazed with

polished transparent coloured glasses, and the celluloids behind the perforations should be of such truly neutralizing colours as not to need much thickness. But perfection of this kind is difficult to obtain.*

The same idea could easily be carried out with green letters and a red line on black cardboard to be use by reflected light, or even on white cardboard, but in the latter case the abolition of fusion would have to be secured by adding prisms as used for former (1884) device of the "arrow tangent scale."

13.—GUIDE TO THE MICROSCOPIC EXAMINATION OF THE EYE.

(Concluded.)

BY

PROFESSOR R. GREEFF,

DIRECTOR OF THE UNIVERSITY OPHTHALMIC CLINIQUE IN THE ROYAL CHARITY HOSPITAL, BERLIN,
WITH THE CO-OPERATION OF

PROFESSOR STOCK
(FREIBURG)

AND

PROFESSOR WINTERSTEINER
(VIENNA)

TRANSLATED FROM THE THIRD GERMAN EDITION,

BY

HUGH WALKER, M.A., M.B., C.M.

OPHTHALMIC SURGEON TO THE VICTORIA INFIRMARY, GLASGOW.

Optic Nerve.

The method of dividing the optic nerve, and of incising the dura along its outer aspect so as to afford a guide in the localisation of the sections, has already been described. Müller's fluid is the most generally useful hardening medium, permitting the employment of most stains except those for tubercle bacilli. When it is desired to demonstrate recent degenerative processes Marchi's fluid should be chosen, while the distribution of the neuroglia is displayed by the methods of Golgi and Weigert.

Imbedding in paraffin cannot be recommended, the high temperature producing shrinking of the connective tissue.

The course of the optic nerve is divisible into the following segments:—

The optic radiation.

The optic tract.

The chiasma.

The intracranial portion of the nerve.

The intracanalicular portion.

The intraorbital portion—

(a) Before the entrance of the central blood-vessels.

(b) After the entrance of the central blood-vessels.

The intraocular portion—

(a) The medullated scleral portion.

(b) The lamina cribrosa.

(c) The papilla.

Each of these parts exhibits histological peculiarities which require to be specially examined.

* The manufacturers have taken so much trouble over this appliance that it would be hardly fair to restrain its registration, which is, however, in their interest alone.

The intraocular portion is studied in longitudinal sections stained by van Gieson's method which displays admirably the distribution of the connective tissue. Some of the sections should be treated by Weigert's method to show the medullary sheaths. These cease at the level of the lamina cribrosa.

A few millimetres behind the bulb transverse sections should begin to be made. These also are stained by van Gieson's method. The dural, arachnoidal, and pial sheaths can be distinguished surrounding the stem of the nerve. The pial sheath gives off septa which pass into the nerve and divide it into compartments, these being again subdivided into smaller spaces by secondary septa. This frame-work carries the nutrient blood vessels, the central vessels being contained in a stout bundle of connective tissue in the middle of the nerve. The connective tissue exhibits a few spindle-shaped slender nuclei. The medullated fibres are surrounded by the penetrating septa, and between the fibres oval nuclei belonging to neuroglia cells may be distinguished.

Between the pial sheath and the peripheral nerve bundles there is a narrow zone, which displays a fine meshwork of neuroglia fibrils, and is devoid of nerve fibres. This is the *neuroglia mantle* of Fuchs, and was at one time mistaken for an atrophic condition (peripheral atrophy).

Retrobulbar fatty tissue, muscular fibres, and ciliary nerves and vessels, are seen around the section of the nerve.

The entrance of the central vessels is met with farther back. At this level the cross-section of the nerve has a reniform outline. The vessels are accompanied by a thick offshoot of connective tissue.

Behind the entrance of the central vessels the connective tissue stroma is much more scanty.

The nerve is embraced by the periosteum in its intracranial portion.

Beyond the optic foramen the dura leaves the nerve.

At the chiasma horizontal sections stained with hæmatoxylin and eosin or by van Gieson's method are instructive. The nerve fibres are here no longer divided into bundles by septa. Only a few delicate strands of connective tissue are found projecting into the peripheral parts of the chiasma. The nerve fibres are, however, to some extent divided into groups by rows of neuroglia cells. In sections stained so as to exhibit the medullary sheaths the decussation of the nerve bundles can be clearly seen.

The anatomical relations of the nerve fibres are different in the lower animals, and, as a rule, simple. The arrangement found in fishes, although varied, is the simplest. The complete decussation can usually be recognised with the unaided eye. In the pike the right nerve crosses over the left, union taking place only between the pial sheaths; in the herring the right nerve passes through a slit in the left; in the carp both nerves split into two portions which cross like two clasped fingers of the right and left hands.

In birds and reptiles the decussating portions of the nerves are separated into a smaller or larger number of leaves, which intercross like the clasped fingers of the two hands. Vertical sections through the middle of the chiasma have thus a zig-zagged outline. This is well seen in the frog.

Comparative Anatomy.

This is very interesting. The greatest variations are found among the fishes. In the optic nerve of the petromyzon there is an axial column of cells continuous with the cells in the retina. The nerve fibres are grouped around this column. The nerve of the pike is a compact cylinder of fibres, the blood vessels running parallel with these. In most of the bony fishes

branched trabeculæ of connective tissue penetrate the nerve stem, but do not reach the opposite side. The nerve thus acquires a ribbon-shaped structure. The simplest case of this kind is seen in the sturgeon, whose optic nerve is S-shaped in cross-section. In the sole, salmon, whiting, etc., there are several folds. The carp's nerve is in the form of branched compound processes. The division of the fibres into distinct bundles begins to appear in the eel and the cobitis fossilis.

In the larval stage of the amphibians a strand of neuroglia cells is present on the dorsal aspect of the developing optic nerve. These are remains of the epithelial optic stalk; at a later stage they occupy a more central position in the nerve. In fully developed specimens of *salamandra maculata* the optic nerve consists of parallel rows of neuroglia cells separating isolated bundles of nerve fibres.

In the turtle the nerve fibres are arranged so as to form a trench which is occupied by a process of connective tissue carrying the blood vessels. The neuroglia cells are distributed throughout the sections, but are most closely packed in the centre of the nerve.

Neuroglia septa are present in the reptiles. The cells forming these are arranged in longitudinal rows, and communicate with each other by means of their numerous processes.

In the serpents processes derived from the pial sheath separate the fibres of the optic nerve into distinct bundles. In the centre of each bundle there is a row of neuroglia cells surrounded by the nerve fibres.

The nerve is ribbon-shaped in most birds.

In mammals connective tissue septa are always present. The higher an animal stands in the class, the more numerous are the septa, and the more complete the separation of the nerve fibres into distinct bundles.

In the optic tract trabeculæ are absent, there being only a thin (30μ in thickness) covering over the fibres. These latter are still medullated.

In the newly-born child the fibres in the orbital portion of the nerve are, as a rule, destitute of medullary sheaths. These are not fully developed till the ninth or tenth week.

Demonstration of Elastic Tissue.

The method of Unna or Weigert is adapted for this purpose. The sheaths of the nerve contain an abundance of this tissue. The lamina cribrosa is composed mainly of elastic fibres.

NEUROGLIA.

Golgi's Method.—The dural sheath should be removed, and a portion of the optic nerve, two or three millimetres in length, placed for 12-24 hours in the osmio-bichromate mixture, and for the same length of time in the silver solution. This procedure is usually successful. It is best to take the optic nerve and chiasma from a newly killed animal, *e.g.*, a pigeon.

Weigert's Method.—There is an extraordinary increase of neuroglia in the optic nerve when it is atrophied.

ISOLATION OF THE NERVE FIBRES.

The nerve bundles are composed of groups of nerve fibres. Each nerve fibre again consists of an axis cylinder surrounded by a thin sheath of myelin. Varicosities are often found on the nerve fibres. These are probably produced artificially in the removal of the sheaths. In the optic nerve the fibres do not possess a neurilemma or sheath of Schwann, the nucleated membrane which

surrounds the myelin sheath in most nerve fibres; the myelin is in direct contact with the neuroglia. The calibre of the fibres varies greatly, some having a diameter of 10μ , while others are infinitely slender.

It is not easy to obtain isolated portions of the nerve fibres of any considerable length, since the myelin sheath crumbles very readily and the axis cylinders are easily torn. The best preparations are obtained by macerating pieces of fresh nerve in a weak ($\frac{1}{30}$ – $\frac{1}{40}$ per cent.) solution of chromic acid, or in a 10 per cent. salt solution; or by hardening the pieces in osmic acid, macerating in water, and then teasing them. Medullated nerve fibres are well demonstrated in thick sections treated by Golgi's method; for non-medullated fibres the methylen blue method of Ehrlich is most suitable.

CORPORA AMYLACEA.

Homogeneous spherical bodies, 15 – 25μ in diameter, are often found inside the bundles of the optic nerve. They occur also in other parts of the nervous system, and are called corpora amylacea. They are usually present in large numbers in atrophied nerves, but they are found not uncommonly in normal nerves. Their favourite seat is the chiasma and its neighbourhood or the optic tract. They are always present in certain animals, *e.g.*, the cat and the dog. Iodine stains the corpora amylacea yellow; iodine and sulphuric acid colour them a beautiful violet. They are stained deep blue by hæmatoxylin, and yellowish or red by van Gieson's mixture.

Recent degenerative processes are studied in specimens treated by Marchi's method. Suitable tissue is obtained by dividing the optic nerve, or enucleating one eye.

Atrophic nerves exhibit an increase in their supporting tissue (sclerosis). This is well shown in cross-sections stained by van Gieson's method. Weigert's stain for the medullary sheaths displays the changes in the nerves fibres.

In cases of neuritis retrobulbaris centralis and where there has been amblyopia due to tobacco or alcohol, the papillo-macular bundle is found to be atrophied.

APPENDIX.

THE EXAMINATION OF THE SECRETIONS AND BACTERIA OF THE EYE.

BY

PROFESSOR STOCK.

1.—On Procuring the Secretion.

(A) *Conjunctiva*.—It is important to examine the secretion at the right moment. The organisms which cause the inflammation are most readily found while the disease is still advancing. When a conjunctivitis is subsiding, it is quite possible that, although the secretion is plentiful, the organisms are no longer present. Indeed, the secretion may be germ free, or contain only parasitic bacteria.

A flake of mucus should be removed from the lower conjunctival sac by means of a sterilised platinum loop, or, in case of need, by means of a clean thin match. The specimen should include mucus, since the tears alone contain too few organisms. If there is no secretion in the conjunctival sac, there is almost certain to be some at the inner canthus. Specimens from this spot are, however, apt to be contaminated by parasites from the skin.

The mucus should be spread on a clean slide in a very thin and uniform layer.

The preparation must now be fixed. This is accomplished by passing the slide through the flame of a spirit lamp, so as to raise it to a temperature which can just be borne by the back of the hand. The specimen is now ready to be stained.

(B) *Cornea*.—When it is desired to examine a corneal ulcer for bacteria, the specimen should be taken from the advancing margin, and be removed by means of a bent platinum wire, or, in practised hands, by means of a Graefe knife. In any case care must be taken that intact cornea is not injured, and so infected with septic matter.

(C) *Contents of the Eyeball*.—Some of the contents are removed by means of a hypodermic syringe. If cultures are to be made, the spot where the needle is inserted should be touched with the galvano-cautery. If the eyeball has been enucleated, it is better to incise the tunics, and remove a specimen with the platinum loop.

2.—STAINING.

1. *Löffler's Methylen Blue Solution*.

Concentrated alcoholic solution of methylen blue	...	30
Caustic potash, 1 per cent.	... ..	100

The preparation, after being fixed by heat, is immersed in this for 20-30 seconds.

Washing in water,

2. *Gram's Stain*.

(a) *Anilin-water Gentian-violet Solution*.

5 per cent. aqueous solution of gentian-violet	...	88
Anilin oil	... ..	2
Absolute alcohol	... ..	10

The mixture should be well shaken for a quarter of an hour, and then filtered. It keeps for about two months.

In this the preparation is stained for 25 seconds.

(b) Washing in water.

(c) Treatment with Lugol's solution (iodine 1, iodide of potassium 2, water 300) for 15 seconds.

(d) Differentiation in absolute alcohol, till the blue colour is no longer given off; in the case of thin preparations for 1-2 minutes.

(e) Washing in water.

(f) Staining in a 5 per cent. aqueous solution of safranin for five seconds.

Gram-positive germs are blue, gram-negative red.

Weak carbol-fuchsin (1 : 20) may be used instead of safranin.

3. *Tubercle Bacilli*. For the demonstration of these the following is the best method:—

(a) *Carbol-fuchsin*.

Fuchsin	... ..	1
Alcohol, 90 per cent.	... ..	10
Aqueous solution of carbolic acid, 5 per cent.	...	100

The cover-glass is heated over the flame of a spirit lamp till steam begins to rise.

(b) Washing in water.

(c) Treatment with 2 per cent. hydrochloric acid anilin-water for two to three seconds.

(d) Differentiation in absolute alcohol till red clouds are no longer given off.

(e) Washing in water.

(f) Staining in Löffler's methylen blue for ten seconds.

(g) Washing, alcohol, oil, balsam.

4. *Giemsa's Stain*. This is very useful for staining scrapings of epithelium. The everted conjunctiva is gently stroked with the edge of a cover-glass, and the material thus obtained is spread over a second glass. After the preparations have dried in the air, they are fixed for ten minutes in equal parts of absolute alcohol and ether, and then stained for half an hour in Giemsa's fluid. The stock solution should be procured from Grüber. One drop of this is added to 1 c.cm. water.

5. *Capsules*. When it is desired to stain capsules, the simplest method is to treat the preparation in a saturated solution of methyl-violet for three to four seconds, to mount it in water, and to examine it under water.

N.B.—Gram's method is the most useful for our purpose. There are so few germs in question that it is almost always possible to make a diagnosis by this method alone.

Description of the Commoner Micro-organisms.

I. GRAM-POSITIVE.

(a) *Xerosis Bacilli*. *Pseudodiphtheria bacilli*. These are short rods, and are present in every conjunctival sac, sometimes in enormous numbers in the secretion at the canthi. If the preparation is too thick, we may find in parts red-stained rods which appear smaller than the *Xerosis bacilli*. Such they are, nevertheless, and the stain has not reached them properly owing to the thickness of the preparation. A germ stained blue by Gram's method appears larger than the same germ stained red by safranin.

(b) *Diphtheria Bacilli*. It is frequently impossible to distinguish these from the *Xerosis bacillus*. When the organisms are arranged in pallsade form, they are probably *diphtheria bacilli*.

(c) *Staphylococci*. Microscopic examination does not enable us to distinguish the pathogenic *Aureus* from the non-pathogenic *Albus*.

(d) *Pneumococci*. These are oval-shaped cocci, often arranged in pairs. They frequently vary in size. (Serpiginous ulceration of the cornea, pneumococcus conjunctivitis in children, suppuration of the tear-sac).

(e) *Streptococci*. These form chains containing as many as twenty cocci. (Membranous conjunctivitis, suppuration of the tear-sac).

2. GRAM-NEGATIVE.

(a) *Diplobacilli*. These lie in pairs with their narrower ends touching (Chronic conjunctivitis. Corneal ulcer).

(b) *Bacterium Coli*. Sometimes found in cases of acute catarrh in new-born children.

(c) *Koch-Weeks' Bacilli*. Very small slender rods. They set up an acute contagious conjunctivitis.

(d) *Influenza Bacilli*. These occur as small rods which are thicker than the *Koch-Weeks' bacilli*. They cause conjunctivitis, and are also found in suppurative affections of the tear-sac.

(e) *Bacillus Pyocyaneus*. This is smaller than the *bacterium coli*. It sometimes causes severe ulceration of the cornea.

(f) *Gonococci*. These are Gram-negative, and thus easily distinguished from staphylococci. The methylen blue stain does not allow us to distinguish between them. They usually occur in pairs, and are frequently found in the interior of the cells.

(g) *Micrococcus Catarrhalis*. This is rarely met with, so that its presence is not likely to lead to a false diagnosis.

(h) *Bacillus Pneumoniæ Friedlaender*. This is sometimes found in pus from the tear sac. It possesses a distinct capsule.

The reaction given by the *Bacillus subtilis* is not a constant one. Sometimes it is Gram-positive, at other times Gram-negative. This bacillus has been found in cases of violent panophthalmitis.

Staining of Gram-positive Micro-organisms in Sections.

Celloidin sections.

Staining for 24 hours in filtered alum-carmin.

Staining on the slide for 25 seconds with anilin-water gentian-violet.

Washing in water, the section being kept on the slide by means of a needle or glass rod.

Treatment with Lugol's solution for 13 seconds.

Drying with filter paper.

A piece of dry filter paper is now laid on the specimen, and anilin oil is poured over it. This prevents shrinking and folding of the section. Further differentiation is carried out in anilin oil till blue clouds are no longer given off.

Xylol, changed 4 or 5 times. Balsam.

Staining of Gram-negative Micro-organisms in Sections.

Celloidin sections.

Staining by the method of Nicolle.

The sections are left for $\frac{1}{2}$ -1 minute in the following solution:

Thionin, saturated solution in 50 per cent. alcohol ... 10

Carbolic acid, 1 per cent. aqueous solution ... 100

Washing in water.

Differentiation for a short time in absolute alcohol. Oleum origani. Balsam.

Staining of Spirochæta Pallida (Greeff and Flemming).

1.—IN FILMS.

All crusts are removed from the surface of the ulcer; and the superficial layers of tissue are scraped away with a sharp spoon. When the bleeding has stopped, a slide is drawn over the raw surface. The film is then fixed in a mixture of alcohol and ether, and stained for twenty-four hours in Giemsa's solution (one drop of the stock solution to 1 c.cm. water.)

Leishman's method also gives good results. The stain is procured from Grüber, and dissolved in methyl-alcohol (0.15 : 100). This is poured over the air-dried specimen. After one minute, the slide is placed in a vessel containing the same staining fluid diluted with three parts of water, and left there for twenty-four hours.

2.—IN SECTIONS.

Levaditi's Impregnation Method.—The pieces of tissue may be hardened in formalin, alcohol, or sublimate. A small piece is left for eight days in a 1.5

per cent. solution of silver nitrate, at a temperature of 38°C . It is then well washed in water, and next placed for 24 hours at the temperature of the room in the following solution:

Pyrogallol	...	...	...	...	...	4
Formalin...	...	...	...	...	...	5
Distilled water	...	...	...	...	...	100

It is then washed, and imbedded in celloidin or paraffin.

3. *Burri's Chinese Ink Method*.—This is simple and effective, and exhibits the organisms unstained. After the crusts have been removed from a fresh pustule by means of cotton wool moistened with physiological salt solution, a Bier's suction glass is placed over the raw area and a loopful of the serum thus extracted is transferred to a clean slide, and rubbed up with a loopful of sterile water, and a loopful of Chinese ink. Since the ink may contain bacteria, it should be sterilised for several days in succession, and allowed to settle for several days.

4. The living and motile spirochæta is readily demonstrated, if a drop of serum is placed on a slide and examined in the dark field. The serum may be obtained in the manner just described, or by abrading the skin.

Trachoma Corpuscles.

GREEFF'S MODIFICATION OF GIEMSA'S METHOD.

In recent times Giemsa's method has been much employed to demonstrate the Chlamydozoa or trachoma corpuscles. The conjunctival secretion is taken with a platinum loop, and smeared on a slide in as thin a layer as possible.



FIG. 6. Platino-iridium Scarificator.

The conjunctival epithelium is obtained by scraping the surface with the edge of a cover glass, and spreading out what is removed in the same manner as a blood preparation; or a specially constructed platino-iridium instrument (Fig. 6) may be used to remove the epithelium, and spread it out in a very thin layer on cover glasses. It is not advisable to spread the specimen by drawing one cover glass over another, nor to compress it by hard rubbing.

The film is dried in the air, and fixed by immersion in absolute alcohol for 20-30 minutes. The cover-glass is then floated on the freshly prepared staining solution, film-side downwards, and exposed to the action of the stain for 6-9 hours.

The staining solution consists of:—

1. Twelve parts of Giemsa's eosin solution (25 c.cm. of a 1 per cent. solution of French eosin in 500 c.cm. of distilled water, *i.e.*, 1 to 20,000 eosin).
2. Three parts of a solution of azur I (1 to 1,000).
3. Three parts of azur II (0.8 to 1,000).

These three solutions should be thoroughly mixed by vigorous shaking, filtered, and preferably raised to a temperature of 37°C .

The sections, after being treated with the stain for 5-9 hours at the above temperature, are rinsed in distilled water, dried well with blotting paper, and, without being heated over a flame, mounted in cedar oil. If the staining is carried out at a temperature of 56°C ., three hours suffice.

Hartmann recommends a wet fixation method, the cover-glasses being at once immersed in an alcoholic solution of corrosive sublimate for 1-2 minutes; and then for a time in 50 per cent. alcohol.

Heidenhain's Iron-Hæmatoxylin Method may be employed instead of Giemsa's to demonstrate these corpuscles.

Differentiation.

The corpuscles stand out more clearly if the preparations are differentiated in an acid. The smears, after being treated with Giemsa's stain, are placed in absolute alcohol till they assume a blue colour, and are then, if necessary, exposed to a 1 per cent. solution of acetic acid (Lindner, Flemming).

Demonstration in Sections.

A fold of the conjunctiva is hardened in alcohol, and imbedded in paraffin. The paraffin is removed, and staining is carried out by Giemsa's or Heidenhain's method (4-5 hours). Washing in alcohol for 4-5 minutes. Mounting in cedar oil.

The corpuscles have hitherto been found in cases of trachoma and ophthalmia neonatorum.

[THE END.]

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—THE LACRYMAL PASSAGES.

- (1) Elliot, R. H. — Two cases of pneumocele of the lacrymal sac. *Indian Medical Gazette*, November, 1909.
- (2) Reid, J. — Blennorrhœa of the lacrymal sac. *British Medical Journal*, 22nd January, 1910.
- (3) Brown, W. McEnery. — The treatment of the lacrymal sac. *Annals of Ophthalmology*, Vol. XIX, April, 1910, p. 259.
- (4) Darier, A. — Lacrymative dacryocystitis. *La Clinique Ophtalmologique*, 10 mai, 1910.
- (5) Blaauw, E. E. — Facts, old and new, about the lacrymal apparatus. *Ophthalmology*, July, 1910.
- (6) Foster, J. — Congenital blennorrhœa of the lacrymal sac. *Ophthalmic Review*, September, 1910.
- (7) Jocqs, R. — On the treatment of excretory disorders of the lacrymal passages. *La Clinique Ophtalmologique*, 10 janvier, 1911.
- (8) Churchill, S. — A case of fistula of the lacrymal sac. *Lancet*, 11th January, 1911.
- (9) Ostwalt, F. — The treatment of obstruction of the lacrymal passages and its sequelæ by means of drainage by skeins of thread. (Traitement de l'obstruction des voies lacrymales et de ses suites par le drainage à l'aide d'échevaux de fils.) *Archives d'Ophtalmologie*, avril, 1911.

- (10) Armaignac, H.—A simple means of facilitating catheterism of the lacrymal passages in cases of pronounced constriction. (Un moyen simple pour faciliter le cathétérisme des voies lacrimales dans les cas de rétrécissement très prononcé.) *La Clinique Ophthalmologique*, 10 juillet, 1911.
- (11) Cassimatis, C.—Bilateral congenital purulent dacryocystitis, with some reflections on the ætiology. (Double dacryocystite congénitale purulente et quelques considérations sur son étiologie.) *La Clinique Ophthalmologique*, 10 juillet, 1911.
- (12) Fergus, A. Freeland.—Treatment of lacrymal suppurative disease. *Ophth. Review*, August, 1911.
- (13) Smith, Priestley.—On the use of lacrymal styles. *Ophth. Review*, September, 1911.
- (14) Mackay, George.—Penicillium glaucum from the right inferior canaliculus causing epiphora. *Trans. Ophth. Society U.K.*, Vol. XXXI, Fasc. 3, 1911, p. 219.
- (15) Bribak, E. J.—Clinical and microscopical investigation of the frequency of tuberculosis of the lacrymal sac, with remarks on diagnosis and treatment. (Klinische und mikroskopische Beiträge zur Häufigkeit, sowie zur Diagnose und Therapie der Tränensack-tuberkulose.) *Klin. Monatsbl. f. Augenheilk.*, Dezember, 1911.
- (16) Cassimatis.—Double congenital purulent dacryocystitis, together with some considerations concerning its ætiology. (Double dacryocystite congénitale purulente et quelques considérations sur son étiologie.) *Bull. de la Soc. d'Ophthal d'Egypte*, 1911, p. 36.
- (17) Pokrowski.—On polypi of the lacrymal sac. (Sur les polypes du sac lacrymal.) *Ann. d'Oculistique*, mai, 1912.
- (18) Valois, G. and Lemoine, P.—Practical results in lacrymal therapeutics. (Les résultats pratiques en thérapeutique lacrymale.) *Ann. d'Oculistique*, juillet, 1912.
- (19) Tooke, Frederick.—Polypoidal formation in the lacrymal sac. *Trans. Amer. Ophth. Society*, Vol. XIII, Part I, 1912.

(1) These two cases were discovered by chance by Elliot, of Madras, within a month of each other in patients who came for cataract extraction. They were male Hindoos, aged respectively 45 years and 72 years. In the first instance, it was noticed, when the patient was under chloroform for excision of the right lacrymal sac, that "with each stertorous expiration the left sac was blown out like a bellows, falling back again with the inspiratory effort." There was lacrymal obstruction and dacryocystitis of the right side. In the second patient, also, it was the left sac which became visibly distended with air during expiration with mouth and anterior nares closed. If the sac was then pressed upon, the air, passing down into the nose, produced a distinct musical note. This sound had been discovered by the patient accidentally six months before. In each case there was closure of the canaliculi—complete in the second case, not quite complete in the first. In this latter case the affected sac was extirpated. At the time of the operation it was found that the nasal duct below was abnormally open. A No. 12 Theobald probe passed very easily. "The obstruction above and the free wide passage below would appear to have determined the very unusual condition found." H. HERBERT.

(2) In the case reported by **Reid** (London), blennorrhœa of the sac occurred after measles.

ERNEST THOMSON.

(3) **Brown** recommends: (i) slitting up the lower canaliculus and repeated injections of boric acid, alum, zinc sulphate, carbolic acid, silver nitrate, chloride of zinc, bichloride of mercury, protargol, and argyrol, the injections being varied to suit the case. In many cases injections will remove the trouble, but where they fail, (ii) "Probing is the order." Too small a probe should not be used, and the operation should be repeated every third day. (iii) If there is a tendency to closure of the duct after probing, styles may be worn. (iv) Electrolysis. (v) Finally, in cases of osseous stricture which do not yield to the above treatment, excision of the sac is recommended.

JOHN WHARTON.

(4) **Darier's** article, on the somewhat threadbare subject of the treatment of lacrymal troubles, follows, in general, the usual lines. It is interesting to note that he deprecates too early resort to the use of probes, the use of large probes, and the tendency to "rush" the excision of the sac before other methods have been given a trial. As he says, it is a good operation for those who for any reason are unable to attend for regular treatment, but an operation which, he thinks, has been abused of late years.

ERNEST THOMSON.

(5) This article by **Blaauw**, of Buffalo, is a review of the literature of the last ten or twelve years, dealing with the lacrymal apparatus and its diseases. It is a somewhat lengthened article, covering, as it does, the history of the subject from the twenty-third century B.C. to our own day, the anatomy and physiology of the organs concerned, their diseases, and their treatment. It therefore does not lend itself to abstracting, but will repay perusal in the original. A bibliography is given.

A. J. BALLANTYNE.

(6) Two cases are quoted by **Foster** (West Hartlepool) in babies, three weeks and ten days old respectively. In each there was a muco-purulent conjunctivitis, pressure over the sac causing regurgitation. The treatment adopted, with satisfactory result, was "expression" of the sac followed by instillation of an astringent lotion, *e.g.*, zinc chloride, and occasionally application of solution of silver nitrate, grs. ii. to the ounce. The brother of the second case had a similar condition at birth, and had recurrent attacks of conjunctivitis, developing a marked blennorrhœa, which was treated by another surgeon by slitting the canaliculus and passing a probe. The author mentions the scarcity of literature on this subject, noting papers only by D. Gunn and S. Mayou: in Parsons' *Pathology of the Eye* (Vol. III) numerous references are given. The condition is attributed by several observers to imperfect canalization of the nasal duct, the blocking being due to a mass of epithelial *débris* or to a membrane at the lower end of the duct.

A. H. PAYAN DAWNAY.

(7) The article by **Jocqs**, of Paris, is essentially one directed towards the more conservative treatment of lacrymal troubles. The author holds that only in comparatively few cases is the obstruction in the nasal duct, and if there is no obstruction of this passage, what is the good of passing probes, often of large size? Such probing is destructive rather than curative, except in the few cases where it may be absolutely necessary. In very many cases of lacrymation all that is really required is dilatation (not slitting) of the lower canaliculus, which is obstructed either in its length or at its opening into the sac. Jocqs holds that in advanced life the obstruction of the canaliculus begins with eversion due to paresis of Horner's muscle, and that in middle age the first stage is due to contracture of that muscle. When there is catarrh of the sac and nasal duct obstruction, this obstruction is very often at the upper end of the duct. In such cases one

should not pass probes down the duct until the repeated use of antiseptic injections *via* the dilated (not slit) canaliculus has been tried. In more advanced cases, mucocoele and dacryo-pericystitis, the author is not in favour of extirpation of the sac. He prefers to incise it and to treat it with chloride of zinc. So also with regard to the accessory lacrymal gland, he prefers its destruction with the thermo-cautery to ablation with the knife, when it is desired to abolish its function.

ERNEST THOMSON.

(8) In this case by **Churchill**, of Ryde, there was a minute opening in the skin over the lacrymal sac. There was no evidence of blennorrhœa, and the author concludes that the case is one of those described by Parsons as due to arrested development and minimal failure of the *fissura facialis* to close.*

ERNEST THOMSON.

(9) **Ostwalt**, of Paris, discusses the present position of the treatment of lacrymal obstruction, and enquires why so many cases resist Bowman's method. If the duct would remain permeable between two successive catheterisations a rapid cure might be looked for; that it does not, is due to the presence of cavernous tissue in the mucous membrane. To obtain, then, a lasting result it is necessary to leave a permanent dilator in the passages.

The idea of lead styles is a very rational one, but they are unfortunately not well borne by the eye. Hence, the application of soft drains is the ideal treatment of lacrymal obstruction. The principle is an old one, dating from the middle of the eighteenth century, and was successful then, notwithstanding the lack of general and local anæsthesia, adrenalin; or a good frontal mirror. After briefly reviewing the old methods, the author describes his own, beginning with his special instrumentation, as follows:—

1. A wire-threaded probe.—This is a hollow cannula not larger than a No. 3 or 4 Bowman's probe. Through it passes a very thin and very flexible silver wire terminating at its lower end in a polished silver knob of the diameter of the cannula. By means of a locking-screw, placed at the upper extremity of the instrument, the silver knob can be held pressed against the lower end of the cannula. The instrument can be passed along the lacrymal passages, like an ordinary Bowman's probe.

2. A pair of elbowed forceps with spoon-shaped ends.—The small spoons of this pair of slip-forceps are arranged so that in closing they leave open in the antero-superior fourth of their circumference a small slit with blunt edges, large enough to leave the silver wire free and small enough to enable the silver knob of the first instrument to be firmly grasped in the spoons. The object of the instrument is to grasp the silver knob and to draw it and its silver wire attachment forward to the anterior nares after this probe has been passed into the lacrymal passages.

3. A pulley director.—A nasal probe ending in a fork, between the prongs of which is a small pulley. Its use is to direct the silver wire when it is being drawn forwards and to prevent wounding of the mucous membrane.

4. A fixed nasal speculum.—This is a modification of Vacher's speculum. By means of five joints, controlled by three screws, it can be used in any position, remaining firmly fixed. The upper joint is attached to a forehead band.

Diagrams of these various instruments are given.

Before the operation, the conjunctival sac is freely cocaineised and the lacrymal sac injected with cocaine and adrenalin. Wool pledgets, soaked in a solution of 5 per cent. cocaine with some adrenalin added, are inserted in the nasal cavity.

* Original description due to N. B. Harman (*Trans. Ophth. Society U.K.*, Vol. XXIII, 1903, p. 256).—EDITOR.

The operation itself is described in five stages :—

1. The wire-threaded probe, with the knob fixed at its lower end, is passed through the superior canaliculus, the sac, and the nasal duct.

2. The speculum is inserted into the same side of the nose and directed towards the middle of the lateral wall of the inferior meatus, *i.e.*, towards the site of the lower opening of the naso-lacrymal duct. The wool pledgets are removed, and with the aid of a strong forehead mirror, the silver knob is looked for. If the surrounding area is swabbed with a wool pledget, and the probe moved up and down, the knob can generally be seen shining brightly under the reflected light.

3. The knob is seized with the spoon-ends of the special forceps, which are closed on it.

4. The knob is drawn forwards horizontally to the opening of the nose and with it the silver wire. To avoid the latter wounding the mucous membrane the pulley guide is inserted, the wire running over the pulley in the fork.

5. The upper loop of the thread drain is attached to the silver wire above the knob by means of a slip-knot, the knob is withdrawn through the hollow cannula, and, finally, the cannula itself drawn upwards, bringing with it the upper loop of the drain, leaving the drain itself in the naso-lacrymal duct.

The drain is about $2\frac{1}{2}$ centimetres long, and varies from six to twenty-four strands, according to the stage of the treatment; the strands are knotted at each end with as small a knot as possible, and to each is attached a loop, an upper and a lower for manipulation. By experiment, Ostwalt has satisfied himself from the point of view of capillary and drainage power, as to whether silk, waxed linen, thread, or Alsace thread is the best material for use, and concludes in favour of Alsace thread. The material is impregnated with iodoform (by immersion in ether saturated with iodoform) or by a disinfecting solution ("Glyco-thymoline" for preference).

In treating a case, a drain of six to eight thicknesses is first used, replaced some days later by one of ten or twelve thicknesses, then sixteen to twenty, and, finally, twenty-four. The canal is in this way dilated, little by little, in a manner painless to the patient.

The upper loop, holding the drain, is held fast on the forehead by court-plaster, the lower one is placed inside the nose. The loops should be washed daily with a disinfectant (1 in 5,000 perchloride of mercury solution), and as often as possible, the lacrymal sacs should be irrigated.

The subsequent drains are inserted by drawing down the one in use, cutting it off at its junction with its upper loop, and attaching to the latter the upper loop of the new drain, which can be thus drawn into place.

If suppuration continues, the author injects five or six times a solution of 1 per cent. silver nitrate, repeating it every two or three days. The solution is made to pass along the length of the drain.

In the cases in which the bony wall is not concerned, the drain is allowed to remain for a month, and where this structure is altered, for from six weeks to two months.

A report of eight cases treated by the author is given, and in conclusion he sums up as follows.—1. In all cases of epiphora, dacryocystitis, lacrymal fistula, etc., where the classical treatment by probes and antiseptic injections does not lead to a cure in the space of some weeks, permanent drainage in the manner above described is absolutely indicated. 2. The most suitable cases are those in which there is fibrous contraction, with or without alteration in the bony wall of the duct. 3. The method is excellent for children, where catheterisation without narcosis presents very great difficulties, and where there is a risk of making false passages. 4. It is

useful for patients who are unable to attend for the frequent treatment demanded by other means, and is a pleasanter form than that by repeated catheterisations. The method demands a sufficient familiarity with rhinological *technique*, but in adopting it, the surgeon will be recompensed for his trouble by securing rapid success in cases otherwise incurable.

BERNARD CRIDLAND.

(10) **Armaignac**, of Bordeaux, who is a strong partisan of conservative treatment in cases of disease of the lacrymo-nasal apparatus, and who believes that mutilation of the lacrymal sac should not be undertaken until all other methods have been exhausted, here describes a method of facilitating the passage of the probe in difficult cases. It consists merely in the introduction into the lacrymal passages of a few drops of sterilized olive oil. When a little pressure has been exerted on the wall of the sac, so as to press the oil down into the duct, the passage of the probe is rendered much easier. Merely greasing the probe has not nearly such a good effect, because the grease is so easily rubbed off.

ERNEST THOMSON.

(11) The chief points of interest in the case reported by **Cassimatis**, of Alexandria (Egypt), are, in the first place, the rarity of double purulent congenital dacryocystitis; in the second place, the fact that the lacrymal passages were quite wide; and, in the third place, the fact that while cure did not follow probing, the condition was almost immediately arrested by washing out the lacrymal passages, in the course of which treatment fluid passed freely into the nose. The child was four weeks old when seen by Cassimatis, and at first sight presented the ordinary appearance associated with ophthalmia neonatorum.

The author discusses the ætiology of congenital dacryocystitis, which is still a matter of doubt. The following theories have been put forward.—

- (1) Failure of the usual ante-natal perforation at the lower end of the nasal duct.
- (2) The formation of a valvular opening at this point.
- (3) Excessive dilatation of the lacrymal passages. Such dilation was found three times by Rochon-Duvigneaud at the autopsy on thirty fœtuses or new-born infants.
- (4) Syphilis.

The present case seems strongly to support the theory of Rochon-Duvigneaud, as one which sometimes may be applicable. The author also discusses briefly the question of the very early infection. The pus was found to be staphylococcic, and as the incubation period of the staphylococcus is no longer than that of the gonococcus, the infection can be explained in the same way as that of ophthalmia neonatorum when present at birth. Cassimatis, it may be observed, here accepts as true the statement of the mother (an intelligent woman) that yellowish pus was present about the child's eyes on the actual day of birth.

ERNEST THOMSON.

(12) **Fergus**, of Glasgow, passes in review the various forms of treatment which have been employed. He considers syringing and probing, without section of the canaliculus, a rational though lengthened procedure, but advises removal of the sac as the best form of treatment. He has never had to remove the lacrymal gland for troublesome post-operative epiphora.

A. H. PAYAN DAWNAY.

(13) The use of styles is advocated in some cases as a form of treatment which can be adopted with advantage without recourse being had to the more radical method of extirpation of the sac. **Priestley Smith**, of Birmingham, incises the canaliculus, so that the gutter produced is backward and lies in contact with the globe; a hollow probe, attached to a syringe containing cocaine and adrenalin solution, is then very gradually passed into the nose. When the passage is reopened, a lead style is inserted, to ascertain the size required, and then a silver one is fitted; this can be worn for months, the passage

being cleansed by occasional syringing. When discharge and watering cease, the style may be removed, and kept for use in event of recurrence. He has treated many cases satisfactorily in this way. A. H. PAYAN DAWNAY.

(14) After slitting the lower canaliculus in a patient, 50 years of age, who complained of epiphora of some weeks' duration, **Mackay**, of Edinburgh, removed "a small plug of yellowish buffy matter," unlike ordinary muco-pus. This was found to be made up of a rich growth of penicillium glaucum.

SYDNEY STEPHENSON.

(15) **Bribak**, of St. Louis, arrives at the following, among other, conclusions.— Apart from cases with lacrymal fistula, accompanied by spongy granulations, and those of dacryocystitis associated with tuberculosis of the face, conjunctiva, or nasal mucous membrane, tuberculosis of the lacrymal sac occurs more frequently than is generally believed, and may be the only ascertainable tuberculous lesion.

Very few cases have been reported in which tuberculous dacryocystitis was clinically diagnosed, without the presence of the above-mentioned accompaniments, but nevertheless, tuberculosis may underlie an apparently simple dacryocystitis or lacrymal cellulitis. On this point he differs from Elliot, who, as the result of microscopic examination of unselected examples from a large number of cases, concluded that tuberculosis does not play an important part in the ætiology of dacryocystitis. The author holds that before excluding tuberculosis, it is necessary to cut the whole sac in serial sections, since it is easy to miss a small tuberculous focus. Out of sixteen sacs preserved from among a much larger number excised at Freiburg during the past two years without reference to the question of tuberculosis, he found two which were definitely tuberculous. Clinically, these had been classed as simple dacryocystitis. The same remark applies to four out of a total of nine cases of tuberculous dacryocystitis which he has examined. The clinical diagnosis of tuberculous dacryocystitis may be made if the usual pyogenic organisms are absent from the discharge; if the tubercle bacillus is present (a very rare occurrence); or if injections of tuberculin give a local as well as a general reaction. Even more helpful is the presence of "Axenfeld's symptom-complex," *viz.*, a doughy-elastic resistance, which does not disappear on pressure, epiphora, and delayed, but unobstructed, passage of fluid syringed through the lacrymal passages.

In two out of nine excisions of a tuberculous sac, granulations appeared in the scar after primary healing. The author thinks that this may be due to infection of the wound by scraping. Since adopting cauterisation in place of scraping, such infection has not occurred.

A. J. BALLANTYNE.

(16) Yellow discharge was noticed to run from a baby's eyes on the day of birth. When seen by **Cassimatis**, of Alexandra, a month later, the child appeared at first sight to be affected with ophthalmia neonatorum. On more careful examination, however, the condition resolved itself into one of bilateral dacryocystitis, the muco-pus from which was found to contain staphylococci. Digital pressure and the use of argyrol led to no good results, although employed for about twenty days. The case was eventually cured by the passage of probes (Nos. 1 and 2, Bowman) and the injection of fluid.

Cassimatis, in discussing this case, espouses Rochon-Duvigneaud's theory of causation, namely that the condition is due to excessive dilatation of the lacrymal passages, leading to a kind of stasis of the contained secretion (*Archives d'Ophthalmologie*, février, 1899). Syphilis and occlusion of the lower end of the nasal canal may, he thinks, be put on one side, since the history of the case, together with the result of the probings and injections, do not tell in their favour.

SYDNEY STEPHENSON.

(17) **Pokrowski**, of Moscow, records a case in which a polypus, 8 mm. by 4.5 mm. by 3.5 mm., was found attached by a pedicle, 1 mm. in diameter, to the posterior wall of the lacrymal sac. He refers to the great rarity of such tumours, but argues that there is no essential difference between them and pseudo-polypi, or vegetations with relatively large bases. **R. J. COULTER**.

(18) **Valois and Lemoine**, of Nevers, after trying the usual methods of treatment for disease of the lacrymal passages, have come to the conclusion that immediate excision of the sac is indicated whenever it is dilated or its walls are thickened. They judge the condition of the wall by passing a probe into the sac and pressing its anterior wall forward, so that it can be palpated through the skin. If there is no marked distension of the sac or thickening of its walls, they try conservative treatment for from three to six weeks, but if a definite cure is not obtained in that time, they perform excision. In acute pericystitis, they wait until the inflammation has subsided, and then excise the sac, but when there is a hypopyon-ulcer present, they slit the canaliculus and dilate the duct with a Weber's conical probe, and keep the passages well washed out, although they recognise that the ultimate result of this treatment will probably be the formation of a permanent stricture. They consider that it is the inflammation and not the stricture which causes lacrymation, and are of opinion that the presence of disease in the nose or in the bones bounding the lacrymal fossa or nasal duct may cause persistence of the symptoms, even after the sac has been completely removed.

R. J. COULTER.

(19) Polypi of the lacrymal sac, resembling those found in the nose and accessory nasal sinuses, are admittedly rare. The published records are few and far between. **Tooke**, of Montreal, has, however, found polypi twice in the microscopical examination of a series of fifty excised sacs. His cases are briefly as under:

1. A young and very healthy-looking woman complained of recurrent attacks of pain and inflammation over the right tear sac. No discharge when pressure was exerted over the region of the affected sac. No thickening of the parts. A diagnosis of stricture of the duct was established by means of the lacrymal syringe. No evidence of nasal polypi, and the accessory sinuses were apparently in a healthy condition. The lacrymal sac was excised, and found to contain a pencil-shaped polypus, of a mottled red colour, measuring about 4 mm. by 2 mm.

2. A man, aged 37 years, complained of watering eyes, of several years' duration. Again, by the aid of the syringe, a diagnosis was reached of lacrymal obstruction. On an attempt being made to excise the left lacrymal sac, a small cut was accidentally made in the wall of the sac, and through this opening a polypus, of pearl-grey colour, and of about the size of an ordinary pea, protruded. The sac was found to contain a second polypus. Microscopically, the polypus was found to consist of a delicate stroma of cells somewhat resembling those of areolar tissue, and separated from one another by a matrix containing mucin. Scattered throughout the matrix were a number of lymphocytes and delicate blood-vessels. The pedicle of the polypus was covered with columnar epithelial cells.

SYDNEY STEPHENSON.

II.—ALBUMINURIC RETINITIS.

- (1) **Widal, Morax, and Weil**.—Albuminuric retinitis and retention of nitrogenous substances in the blood. (*Rétinite albuminurique et azotémie*.) *Ann. d'Oculistique*, mai, 1910.
- (2) **Fau**. — Researches into the ætiology of albuminuric retinitis. (*Recherches sur l'étiologie de la rétinite albuminurique*.) *Ann. d'Oculistique*, novembre, 1911.
- (3) **Parisotti**.—Albuminuric retinitis. (*Retinite albuminurica*.) *Rivista Italiana di Ottalmologia*, June-July, 1912.

(1) Considerable attention has recently been paid to the retention in the system of urea and chloride of sodium in cases of nephritis, and it has been shown that the clinical syndrome and the prognosis are quite different according to which of these substances is retained, exclusively or preponderantly. **Widal, Morax, and Weil**, of Paris, therefore thought it would be interesting to discuss whether there was a connection between albuminuric retinitis and uræmia, which would explain the grave prognosis associated with the ocular condition. They examined 71 patients suffering from nephritis, of whom 17 had retinitis. Of these, only 2 had marked œdema with much retention of chlorides, 9 had slight œdema, easily controlled, and depending on the cardiac failure rather than retention of chlorides, and the remaining 6 had perfect elimination of chlorides with no sign of œdema up to the time of their death. Of 12 patients with marked œdema and retention of chlorides, not one had retinitis. On the other hand, the 17 patients with retinitis all had more or less pronounced nitrogenous retention discoverable by chemical examination of the blood-serum. Eleven of these had characteristic retinitis with retention of more than 2 grammes of urea, and 9 of them died within eleven months, while the remaining 2 were followed for only three months and one month. Four of the others had less marked nitrogenous retention at the first examination, and 3 of them died of œdema after intervals of three, six, and eleven months, while in the fourth, the retention of urea had increased from 0 gr. 96 to 1 gr. 38 in the period of two and a half months, during which he had been under observation. In the remaining two cases retinitis developed while the patients were under observation, and was accompanied by a marked increase in the retention of urea. The authors conclude that so-called "albuminuric retinitis" is really due to the retention of nitrogenous substances in the blood, and should take its place along with somnolence, digestive and respiratory troubles and anorexia in the syndrome, characterising that condition as distinct from retention of chlorides, which produces in the eyes sudden amaurosis, which disappears rapidly when the elimination of chlorides is established, and papillary venous stasis, which disappears without leaving a trace. **R. J. COULTER.**

(2) **Fau** draws the following conclusions from an investigation of the renal elimination, and especially the excretion of the urea, in patients suffering from albuminuria (*a*) with and (*b*) without retinitis, in adults without renal lesions, and in dogs. 1. Injections of methylene blue give unreliable results. 2. The investigation of the maximum concentration of the urinary urea did not give conclusive results. 3. Induced chloruria can only be used in slight cases, owing to the risk of causing complications. 4. The measurement of urea in the blood has not the importance which has been attributed to it. The only investigation which the author found of real clinical value was the simultaneous determination of the amounts of the urea in the blood and the urine and the establishment of the relation between them, which is known as the "uræmic constant," and is obtained by dividing the percentage of urea in the blood by the square root of the amount of urea passed in the urine in 24 hours. The author gives some account of his experiments, and tabulates the results obtained. **R. J. COULTER.**

(3) In this paper **Parisotti**, of Rome, deals with the theory of albuminuric retinitis, which was elaborated by Rochon-Duvigneaud at the annual congress of the French Ophthalmological Society in May of last year.* This theory is, briefly, that the ocular changes are not, as is usually thought, due to the vascular changes, but that they are due directly to the nephritis. And to prove the latter theorem, he makes the statements that the retinitis disappears

* For abstract see THE OPHTHALMOSCOPE, 1912, p. 721.

when the nephritis subsides, and that the retinitis coincides always exactly with the degree of toxæmia, which is the immediate result of the disease of the kidneys. The chief clinical facts on which Rochon-Duvigneaud based his theory are those of the retinitis of pregnancy: he assumes that the retinitis of pregnancy is identical in cause with that of chronic albuminuria. Parisotti tries to show that the two processes differ widely between themselves, and that we cannot judge, from the course of affairs in the former, of the nature of the relations in the latter disease. He points out that the sole trustworthy report on the nature of the changes in the retinitis of pregnancy, that of Cirincione, shows that the assumed identity is very far from real. Further, Parisotti brings evidence to show that the ocular lesions may precede the renal; or, at least, that there may be no signs of renal insufficiency when the eye changes are sufficiently far advanced; this is strong evidence against the view that the changes are the direct expression of the toxins in the blood.

Parisotti is of opinion that the vascular theory explains the clinical facts better than any other.

HAROLD GRIMSDALE.

III.—PATHOLOGY.

(*Second Notice.*)

Magitot, A.—An anatomical study on infantile glaucoma. (*Étude anatomique sur le glaucome infantile.*) *Ann. d'Oculistique*, avril, 1912.

A. Magitot, of Paris, considers that much confusion has been caused by failure to differentiate between the anatomical changes associated with early glaucoma, which can alone indicate the determining causes of the disease, and those found in its more advanced stages, which are largely secondary to the increased tension. He calls attention to the value and rarity of published records of cases illustrative of the former condition, and gives detailed descriptions of the lesions found in three eyes affected with early hydrophthalmos. These eyes were obtained from two very young children, treated in Morax's clinic at the Lariboisière, in whom the disease made its appearance at birth, and in each case death from hepatic insufficiency occurred some hours after an operation under chloroform, although the doses of the anæsthetic administered were very small. These two deaths, as well as a similar one recently recorded by C. Spielberg, would seem to point to the existence of a special risk attached to the production of chloroform anæsthesia in hydrophthalmic children.

Two of Magitot's specimens were obtained from a child which was born with bilateral corneal trouble, which was at first taken for interstitial keratitis. The diagnosis of hydrophthalmos was not made until the patient was three months old, and it was ten months old at the time of its death. Its right eye measured 19 mm. antero-posteriorly and 20 mm. transversely. There was no cupping of the disc, and the optic nerve and retina were healthy. The iris was thin, and the ciliary body was almost completely iridic. The clear ciliary cells were vacuolated with many of their nuclei picnotic. The lenses were abnormally small, the anterior chamber was 3 mm. deep and enlarged at the expense of the angle by sinking of the sclerocorneal trabecular system. The choroid was distended, especially in the layer of large vessels, and contained some hæmorrhages. Leber's venous circle, including Schlemm's canal, was almost absent, and the anterior ciliary veins were very small. There was no trace of inflammation in the ciliary region, but the walls of the posterior scleral emissaries were sclerosed

with remains of inflammation. The calibre of the vorticossæ was much reduced and the posterior ciliary veins were the seat of an obliterating endophlebitis, their calibre being obstructed by new-formed tissue. There was compensating hypertrophy of the long and short ciliary arteries, with considerable thickening of the muscular layer of their walls. The left eye of this child measured 17 mm. antero-posteriorly and 19 mm. transversely. The anterior chamber had not reformed after sclerotomy. There were traces of cupping of the optic disc and of degeneration of the optic nerve. The retina was disorganised in places. The iris was thin and there was a posterior synechia present. The ciliary body was flattened and pressed against the iris. The irido-corneal angle was free, but the canal of Schlemm was almost completely obliterated and infiltrated with round cells containing pigment granules, while its emissary system seemed dilated. The choroid in the anterior two-thirds of the globe was considerably distended, and was torn by several hæmorrhages, some fresh and some old. The chorio-capillaris was very little disturbed. In the uveal layer there were several small patches of leucocytic infiltration. The pigment epithelium was torn and degenerated in many places. The circulus iridis major was distended and full of blood, but the emissaries passing from it through the sclerotic were the seat of endophlebitis with round-celled infiltration which extended as far as the insertions of the recti muscles. There was similar inflammation in the vorticossæ after their exit from the globe, and in their intra-scleral part the calibre of three of them was much reduced, while the fourth was completely obliterated. The same phenomena of endophlebitis were present in almost all the posterior ciliary veins. The walls of the arteries were thickened but to a less extent than in the right eye.

Magitot's third specimen was obtained from a child who had eye trouble from the age of six months and died when fourteen months old. Its right eye measured 19 mm. anteriorly by 22 mm. transversely. The anterior chamber was absent, as the result of an operation, and the walls of the iridic vessels were thickened. The ciliary body was rather atrophic, with sclerosed but open vessels. Schlemm's system was open and even dilated. The emissaries and scleral veins were gorged with blood and showed traces of slight endovasculitis. A large emissary vein was thrombosed. The choroid contained old and recent hæmorrhages with inflammatory foci but the large hæmorrhages were situated in the anterior part of the globe. The only vena vorticiosa found was healthy. The optic nerve showed commencing atrophy and the disc was slightly cupped. There were several thrombosed vessels in the dural sheath. Around the optic nerves there were ciliary arteries with hypertrophied walls similar to those in the right eye of the first case, and the accompanying veins were affected with endophlebitis obliterans.

Magitot adds, for comparison, a description of an eye which had been buphthalmic for years. This, removed from a woman aged 21 years, measured 29 mm. antero-posteriorly by 24 mm. transversely. The anterior chamber was $3\frac{1}{2}$ mm. deep, and the sclera was not thinned. There was a deep cup of the disc and complete atrophy of the optic nerve and of the retina, which was not detached. The pigment epithelium had disappeared and its *débris* was mixed with the remains of the retina. The choroid was completely atrophied without any inflammatory focus or hæmorrhage. The atrophic phenomena were less marked in the anterior segment of the globe. The choroid became almost normal at the level of the ora serrata, the ciliary body was well developed and contained some sclerosed vessels, engorged with blood, while its clear cells were not atrophied to anything like the same extent as the choroid and retina, although some of them were vacuolated. The iris

was a little atrophic, especially at the base, but showed no sign of inflammation. The anterior chamber contained some freshly effused blood, which was found to come from vessels in Leber's venous circle. There was no canal of Schlemm, but its region was formed of a tissue much denser than normal, containing pigment *débris*, evidently the result of old inflammation. The anterior ciliary veins, the scleral emissaries, and the vessels of the limbus were distended and full of blood and showed traces of old inflammation. Some perforating scleral vessels were thrombosed with their lumen blocked by organised clot, but without any round cells surrounding them.

The author gives *résumés* of the anatomical conditions described in cases of hydrophthalmos by Reis (7), Seefelder (8), and Spielberg (1), from a critical examination of which and of his own finding he draws conclusions, which may be summarised as follows :—

Infantile glaucoma is frequently associated with congenital abnormalities, either in the eye or in some other part of the body. In old buphthalmic cases the predominant lesions are those of atrophy and are most marked in the posterior segment of the globe, but in the anterior zones, where the atrophic lesions are less marked, the principal changes are of an extinct or very chronic inflammatory type. Such cases are of value for purposes of comparison only. The sole eyes in which the primary lesions of the disease can be distinguished from the secondary are those in which there is no marked enlargement of the globe. In early hydrophthalmos, the globe is not yet disorganised, and the retina and optic nerve are often intact, while the chief pathological modifications are situated in the anterior segment. When inflammatory lesions are lacking, there is always an aplasia of the venous system of the angle, with absence of the canal of Schlemm, probably due to intra-uterine inflammation. When the inflammatory lesions are minimal, they occur as obliterating endophlebitis of the scleral emissaries and of some of the anterior ciliary veins. When more marked inflammatory lesions are present they may vary in intensity. If slight, they are confined to the venous system of the angle and its scleral emissaries. When of medium severity, they spread to the retro-ciliary region and choroid. When still more severe, they cross the uveal tract and attack the *venæ vorticosæ*. Sometimes, they pass outside the globe and are found in the optic sheaths, the central retinal vein, or the posterior ciliary vessels. The constant presence of these lesions *post-mortem* is comparable with the absence of symptoms during life; the occurrence of corneal troubles and ciliary injection, which have been observed before the onset of hypertony, tend to prove that the morbid phenomena are localised at first in the region of the sclero-corneal angle. In all cases these lesions are venous (endophlebitis). The lesions in early hydrophthalmos and those in early senile glaucoma have a very similar situation, so that nothing resembles an early glaucoma eye more than an early hydrophthalmos eye. We do not know the ætiological agent of the endophlebitis of hydrophthalmos, which is possibly the *treponema pallidum* or its toxins.

Magitot suggests the following explanation of the mechanism by which hypertension is produced.—The venous lesions tend to cause an obstruction to the circulation, which in turn produces elevation of pressure in the arteries, which in consequence become hypertrophied. The increased arterial pressure *plus* the presence of inflammation in their neighbourhood, acts as a stimulus to the clear cells of the ciliary retina causing an increase in the secretion of aqueous, which gives rise to the increased tension. In some cases obstruction of one or more of the *venæ vorticosæ* may be an additional cause.

R. J. COULTER.

IV.—EGYPTIAN OPHTHALMIA.

Meyerhof.—On the epidemic gonococcal conjunctivitis of Egypt and its relationship with trachoma. (*Sur la conjonctivite gonococcique épidémique d'Égypte et ses rapports avec le trachome.*) *Archives d'Ophthalmologie*, mai et juin, 1911.

Meyerhof, of Cairo, finds that about 40 per cent of cases of blindness in Egypt are due to epidemic gonococcal conjunctivitis, and for this reason and for the relationship the disease appears to bear to trachoma, he has made a special study of about 500 cases, and writes at some length on the subject.

Historical.

The history of the disease is not without interest. Corneal leucoma, the most frequent consequence of blennorrhœa, is found mentioned in the papyrus of Ebers, 1650 B.C. The Greeks, under the name of "ardalmia," the Romans by "lippitudo," and the Arabs by "ramad" designated in a general manner purulent ophthalmia. The Arab Al-Châdili in the 14th century, Prosper Alpinus in the 16th, and Volney and Savary in the 18th were the first to point out the extent of ophthalmia and blindness in Egypt. French and English troops suffered considerably in the Napoleonic expedition (1798-1802); in 1798 many returned home blind. The description given by Larrey, a military surgeon, in 1803 is exactly that of ocular gonorrhœa with its complications. Other epidemics, however, reigned from time to time, notably trachoma and a catarrhal conjunctivitis wholly resembling that produced by the Koch-Weeks' bacillus.

In the spring of 1801 more than 3,000 French soldiers were attacked with Koch-Weeks' conjunctivitis without loss of vision in a single case, thus agreeing with the present day observations on this form of epidemic in its innocuity and the period of its appearance. Gonorrhœal epidemics begin in full summer. For half a century the various epidemics were generalised under the name of "Egyptian ophthalmia" up to the time when they were differentiated clinically by Pruner, Gulz, Hoeber, etc.; and bacteriologically by Koch and Kartulis.

The occurrence of the epidemic in the summer season was noted by Macgregor in 1812, and a possible contagion by flies suggested. Other works by Egyptian medical men have appeared from time to time, and some excellent descriptions of the disease have been given by scientific travellers in the country, in more than one instance from personal experience.

Extent.

It is only comparatively recently that cases have been studied under microscopic control. Lakah and Khouri, of Alexandria, found 257 gonococcal cases in 966 of acute ophthalmia. Meyerhof, at the outset of his career in Egypt, found gonococci 80 times in 300 acute infections, and by the end of 1909, in 9,020 patients, there were 2,466 cases of acute conjunctivitis, of which 1,541 (62 per cent.) were due to the bacillus of Koch-Weeks and 497 (20 per cent.) to the gonococcus. Since then the number of his gonococcal cases has amounted to 600. Compared with the incidence of the disease in European clinics, with the exception, perhaps, of Hungary, its extent in Egypt is seen to be very wide.

Peretz noted among 2,374 cases in the ophthalmic clinic of the Infant Protection Society of Egypt 1,056 cases of blennorrhœic conjunctivitis, of which 192, or 18 per cent., showed more or less grave corneal complications. The disease is especially rampant in the country among the fellaheen; in Upper Egypt small endemic areas occur, even in December. Beyond the

Nubian frontiers it is less frequent and the toll of blindness is lower than in other Egyptian provinces. This is especially so at Assouan, although there are still many bad cases in the summer and the author has himself noted it during the winter.

In the Egyptian Soudan, however, it is very rare in reality and never presents an epidemic character. On the whole, the affection appears to be growing less frequent in Egypt generally, and even in Cairo the epidemics are less severe to-day than 30 years ago.

Climatic Influences.

With the exception of the diplobacillary conjunctivitis of Morax-Axenfeld, all acute ophthalmia, comprising gonococcal, Koch-Weeks, streptococcal, pneumococcal, and diphtheritic, increases during the summer and acquires then an epidemic character.

Lakah and Khouri have noted that for Alexandria the epidemic of Koch-Weeks' conjunctivitis appears before that of the gonococcal, the first attaining its maximum in June, the second in September. Meyerhof has verified this, with the exception that in Cairo and Upper Egypt the Koch-Weeks' conjunctivitis attains a primary acme in May or June and a second in September or October concurrently with that of gonococcal ophthalmia.

In December the curve of incidence falls, and sporadic cases only occur until the first days of spring. This is repeated yearly with astonishing regularity, the epidemic varying only in virulence.

A chart is here given showing three curves, namely: the incidence of the cases, the average temperature in Cairo, and the rise and fall of the Nile relatively to the months of the year, and it is seen that gonococcal ophthalmia appears three months after the first marked heat, reaches a maximum two months after the highest temperature in summer, and that both heat and ophthalmia disappear at the same time in December. The chart further shows that there is no relation between the rise of the Nile and the progress of the disease, nor does it depend on the hygrometric state of the air, particularly with regard to its humidity. Neither can be blamed the powerful sunlight, the night freshness, or the dust, for in the harems, where light and dust are rigidly excluded, gonorrhœal conjunctivitis is much more frequent than in sunlit and airy rooms, and, further, no cases occur in February and March, when the dusty winds are prevalent, and plenty in autumn, when the sun is less powerful.

One climatic element alone deserves attention, namely, the heat, but the author asks why does this act almost instantaneously on the Koch-Weeks' conjunctivitis, and only on the gonorrhœal three months after. It is necessary, he says, to better understand the conditions of viability and germination of these two kinds of bacteria outside the human mucous membrane.

Constitutional Influences.

The following table of 471 cases arranged according to age is instructive:

New-born	...	...	...	...	...	5
Sucklings...	...	...	...	...	...	43
Infants from 1 to 5 years	...	...	...	...	...	203
Children from 6 to 10 years	...	...	...	...	...	99
Children from 11 to 15 years	...	...	...	...	...	18
Adolescents from 16 to 20 years	...	...	...	...	...	8
Adults from 21 to 50 years	...	...	...	...	...	84
Adults over 50	...	...	...	...	...	11

The extreme rarity of ophthalmia neonatorum is striking, and according to the author it scarcely reaches 1 per cent. Compared with European statistics, and considering the frequency of urethral gonorrhœa, it is inexplicable. Sameh Bey records 150 cases of conjunctivitis in the new-born in 30,000 of purulent ophthalmia; these, however, were not examined bacteriologically. Butler states that it is unknown in Palestine, and Cant in 18 years of experience in the country never saw a case. Meyerhof has experience of only one small familial epidemic starting from an ophthalmia neonatorum. Usually the disease starts suddenly and for no apparent reason in a child between one and five years and spreads rapidly to those immediately concerned with it; hence the father and men-servants are almost always spared. Neither sex nor race appear to have any influence of import.

Various forms of Gonococcic Conjunctivitis.

Three chief types are described :—

(a) Severe blennorrhœic form, by far the most frequent. Its clinical picture varies with the virulence or the stage of the infection, and with the age and constitution of the patient. It generally presents the usual features of gonorrhœal conjunctivitis, but may appear in a pseudo-membranous form of exceptional severity, especially so in the autumn at the height of the epidemic. Sometimes, it appears as a herpetic form with violet coloration of the lids, gland enlargements, fever, etc., not unlike a true diphtheria, and necessitating a microscopic examination to decide the diagnosis.

(b) Slight or catarrhal form, rather rare. The author has followed 12 cases only. For a certain diagnosis cultures are necessary.

(c) Chronic form or the metablennorrhœic conjunctivitis described by Müller in 1898 and confirmed by Butler in 1907. The clinical picture here is that of an acute purulent ophthalmia presenting alternately periods of remission and exacerbation. Papillary hypertrophy is present, and if the infection occurs in a trachomatous patient, there is a follicular swelling, which marks the morbid process, and renders the diagnosis doubtful. Suppuration in these cases may last, 3, 4, or even up to 8 months, well into the winter. Meyerhof regards the existence of a chronic conjunctival suppuration of gonococcal origin as being a factor favouring the endemic propagation of the disease.

Bacteriological considerations. Mixed infections.

From the microscopic examination of the secretions some idea can be obtained as to the duration of the disease but not as to its gravity. The gonococci, generally intra-cellular during the first 15 days, diminish in number under the influence of treatment and slowly disappear. In the untreated cases they very often become scattered outside the cells and towards the third or fourth week, as many as 150 may be counted in one microscopic field. The cocci themselves vary in size in different cases, but they are not smaller than those found in Europe, as has been maintained.

The mixed infections play an important rôle in Egypt. The gonococcus is found associated with the Koch-Weeks' bacillus, the Morax-Axenfeld diplobacillus, and the pneumococcus, and also, though more rarely, with the influenza bacillus, *B. coli*, staphylococcus pyogenes, Loeffler's bacillus, and staphylococcus pyogenes. In these the gonococcus dominates the scene except when associated with the streptococcus. In nearly all the cases of panophthalmitis from gonococcal conjunctivitis the streptococcus is found.

On transmission.

Though genital gonorrhœa is common enough in Egypt, Meyerhof has come to the conclusion that the most frequent method of transmission is from eye to eye by means of handkerchiefs, towels, etc. The disease usually begins in an infant and spreads among those in immediate attendance on it.

Flies are a possible and probable means of propagation, but their rôle has not yet been proved scientifically. Flies buzzing round an infected patient have been taken by Meyerhof and placed in culture tubes but without result, and he has never found the gonococcus or Koch-Weeks' bacillus on the proboscis or feet of the insects. The infection in one case, however, that of a well-to-do family, could be explained only by these means. The author says, if the gonococcus could be found flourishing outside the human body in the height of the Egyptian summer at a temperature of 30° to 40°C. the explanation of the periodic summer epidemic would be forthcoming.

Relation of Gonococcal Conjunctivitis with Trachoma.

Much literature has appeared on this subject. Arlt first considered trachoma to be nothing else than a chronic blennorrhœa. This has been probably on account of the resemblance between trachoma and the meta-blennorrhœic form, but bacteriological examination by a number of authors has established the difference. The researches of the author enable him to state that gonococcal conjunctivitis particularly favours a conjunctiva already trachomatous. It is also the commonest mixed infection in Egypt. 165 out of 471 of Meyerhof's cases had been previously treated by him for trachoma, and he at first thought the association of the two tended to produce a very grave condition, but now, after longer experience, his opinion is altered, and he agrees with Müller that trachoma attenuates the blennorrhœic infection and exercises a defensive action against the gonococcus. This property is, he considers, partly due to pannus.

Pannus crassus is rather rare in Egypt, pannus tenuis is the rule and appears to protect the cornea like an old leucoma. Many severe cases occur in which pannus is present, and where the prognosis for the cornea seems particularly grave, but which clear up without any corneal complication from the gonorrhœal infection.

In the trachoma which is very persistent with much follicular and papillary swelling, suppuration is usually very prolonged and the corneal complications of the original trachoma appear to "last for ever."

Presumably, the persistence of the suppuration is due to the gonococcus finding a refuge in the folds of the mucous membrane. Trachoma is also frequently found associated with Koch-Weeks or Morax-Axenfeld conjunctivitis.

Complications of Gonococcal Conjunctivitis.

Corneal complications were observed in 191 cases out of 471; 133 times monocular and 58 times binocular, giving a total of 249 damaged eyes. Iritis and arthritis as a complication were never noted, agreeing with Butler's observations. Usually (120 eyes) there was a simple corneal ulceration varying in dimension and depth, and especially localised to the region of the palpebral fissure. In other cases (129 eyes) graver complications were present, *i.e.*, perforating ulcers, partial or total necrosis, and rarely panophthalmitis (from mixed infection).

Perforation, when it occurred, took place in the lower part of the central

ulcers, never in the peripheric ones. The worst cases were those in which there was a complete necrosis of the cornea in less than 48 hours, complete hernia of the iris following. Corneal complications occurred in only six cases whilst under treatment. Excluding ophthalmia neonatorum, of which there were only five cases, 368 cases of 471 were in infants and 103 in adults, and the percentages of corneal complications were: before treatment 37·4 for infants, 45·6 for adults, and during treatment ·8 per cent. for infants, 1·2 per cent. for adults. A total percentage of 38·2 for infants and 48·5 for adults. The figures are explained by the negligence displayed by the population.

Complications occur on the fourth or fifth day from the onset of the disease, are rare in the second week, and very exceptional and harmless when the chronic stage has been reached. The bacteriological findings were varied, a large majority contained gonococci, but in a good number streptococci, pneumococci, staphylococci, and the bacillus of Koch-Weeks and of influenza were found. In one case also *B. coli*, but it was not pathogenic for mice.

Sequelæ of Complications.

These comprised adherent leucoma, staphyloma, and fistula, and phthisis bulbi. In 54 per cent. of the cases temporary or permanent blindness followed the corneal complications. The proportion among infants was lower than that amongst adults. Speaking generally, blennorrhœa is the chief cause of blindness in Egypt.

At the last census, in 1907, the population numbered over 11 million inhabitants, 148,280 of whom were blind in both eyes (1·32 per cent.) and 363,702 blind in one eye (3·25 per cent.), a total of 4·57 per cent. In some provinces it amounts to 6·6 per cent. After purulent ophthalmia, the chief causes of blindness are primary glaucoma and trachoma.

Treatment.

Regarding treatment, Meyerhof has renounced the protective bandage for the unaffected eye, and prefers instead a daily administration of 2 per cent. silver nitrate or 10 per cent. protargol solution. He rightly considers these cases should be treated as in-patients of hospitals, and deplores the fact that there are only 200 beds in Egypt for the treatment of eye diseases. The travelling hospitals, under the direction of A. F. MacCallan, are of inestimable value, but cannot work in the summer in Upper Egypt on account of the great heat, the time, unfortunately, when the gonococcal epidemic is at its height.

As a prophylactic remedy, the author has already suggested isolation hospitals, although, from lack of means, the idea has gone no further than a simple project.

For local treatment he recommends, above all, the use of silver nitrate in 2 per cent. solution, and if this strength is not speedily effective, a 5 per cent. solution, or even the pure stick of silver nitrate, the last being especially good in the metablennorrhœic form. For use at home, he gives an organic silver salt and a lotion of perchloride of mercury. For the treatment of complications he has nothing to add to the means usually adopted in Europe.

Prophylactic Treatment.

This includes advice to the surgeon on the protection of his own eyes during the examination of cases, and for the patient first and foremost isolation.

The habits of the population, even in the highest circles, leave so much to

be desired in the matter of cleanliness that a successful fight against an epidemic is well nigh impossible. It is not considered necessary to wash the head and eyes whilst suppuration is going on, but rather to bandage the eyes tightly with a rag, the colour of which is of the highest importance, blue being chosen for preference. This proceeding is, in fact, allowed by some medical men.

Hopes are entertained, however, by Meyerhof, that the populace will at some future period be taught hygienic principles, and a national movement with this as its aim has already been urged by the Egyptian Ophthalmological Society.

An extensive bibliography is appended to the original.

BERNARD CRIDLAND.

V.—REMEDIES.

(Fourth Notice.)

- (1) **Howitz, I.**—The influence of cocaine and homatropine upon accommodation and upon the size of the pupil. (*Der Einfluss von Kokain und Homatropin auf Akkommodation und Pupillengrösse.*) *Zeitschrift für Augenheilkunde*, Dezember, 1912.
- (2) **Dutoit, A.**—The rôle of syphilis in ocular pathology. (*Du rôle de la syphilis dans la pathologie oculaire.*) *La Clinique Ophthalmologique*, 10 février, 1913.
- (3) **Fromaget, Henri.**—Primary miliary tuberculosis of the bulbar conjunctiva cured by the serum of Marmoreck. (*Tuberculose miliaire primitive de la conjonctive bulbaire, guérie par le sérum de Marmoreck.*) *La Clinique Ophthalmologique*, 10 février, 1913.
- (4) **Jocqs, R.**—A practical application of local anæsthesia with cocaine. (*Une application pratique de l'anæsthésie locale à la cocaine.*) *La Clinique Ophthalmologique*, 10 février, 1913.

(1) **Howitz**, of Berlin, has carried out a research upon cocaine and homatropine as cycloplegics and mydriatics.

Cocaine, he finds, begins to paralyse the accommodation in from five to ten minutes, and the maximum cycloplegia is attained in half an hour. The maximal paralysis lasts ten to fifteen minutes, and disappears completely at the end of an hour and a half to two hours. Small doses of cocaine cause only about three dioptries of loss of accommodation, but a full dose may cause complete paralysis of accommodation. Mydriasis lags behind cycloplegia slightly both in development and retrogression, and never reaches a maximum.

Homatropine begins to paralyse the accommodation in from ten to fifteen minutes, and cycloplegia reaches its maximal value in about one hour and a half. It takes twenty-five hours to disappear entirely. Full doses *always* cause full cycloplegia.

Mydriasis follows cycloplegia, but cycloplegia disappears before the pupil returns to its normal size.

To secure accurate dosage the author used Burroughs, Wellcome, & Co.'s tabloids.

We are unable to agree with him in his statements that homatropine *always* causes a maximal paralysis of accommodation in full doses. We could only wish that it did so.

T. HARRISON BUTLER.

(2) The article by **Dutoit**, of Montreux, is in the nature of a review containing much statistical matter. It is not suitable for abstraction. E. T.

(3) The case reported by **Fromaget**, of Bordeaux, is interesting and important from several points of view. In the first place in spite of "perfectly clear bacillary antecedents," this woman, now twenty-nine years of age and apparently healthy, suddenly developed what looked like a phlycten 4mm. from the corneal limbus, but which was associated with a decided lymphangitis. The author concludes that this, which transplantation into a rabbit proved to be tuberculous, was a primary infection, miliary in type. It was evidently not, recognised for a time, as such a primary tuberculous infection, and it progressed in spite of all ordinary treatment and in spite of excision of the ulcer which had resulted from the breaking down of the little nodule. As soon as the infection of a rabbit, brought about by the transplantation into its anterior chamber of the excised ulcer, revealed the nature of the case, the patient was treated by repeated injections of the anti-tuberculous serum of Marmoreck. Under this the whole affection, except the actual cold abscess of the preauricular gland, simply melted away. The case is a very convincing one as to the value of this form of treatment.

ERNEST THOMSON.

(4) **Jocqs**, of Paris, realising that not only in inflamed eyes but also in the uninflamed, the bite of the fixation forceps is apt to be felt under local instillation of cocaine, has found it useful, in order to avoid the defensive movement of the eye, to inject a few drops of cocaine under the conjunctiva at the site of the fixation.

ERNEST THOMSON.

BOOK NOTICES.

Geometrical Optics. A. S. PERCIVAL, M.A., M.B., B.C.Cantab. London: Longmans, Green, & Co. 1913. Pp. II. and 132. Price, 4s. 6d. net.

This book is written by an ophthalmic surgeon for medical students, and is, therefore, quite unlike the ordinary treatise on geometrical optics dear to the school-master. Its examples have nothing of the academic exercise about them, but are fair samples of the kind of thing the student must know in order to do his professional work.

The author's claim that he has embodied in the text all that can be reasonably demanded in any preliminary examination in science is hardly warranted, seeing that he deals only with those optical systems in which the lenses are separated by less than the sum of their focal lengths, and gives no adequate explanation of either the compound microscope or the telescope. He also makes the very general mistake of assuming that the Huyghenian eyepiece is used both for telescopes and microscopes. Some form of Campani eyepiece, in which the field-glass has $1\frac{1}{2}$ times the focal length of the eye-lens, is generally employed in microscopes. These points should be rectified in the next edition.

For the special purposes of the medical student the book is a very useful one. He will find in it exactly what he needs, without the necessity of wading through quantities of extraneous matter.

G. J. BURCH.

Outlines of Applied Optics. By P. G. NUTTING. Philadelphia : Blakiston. 1912. Pp. V. and 234. Price \$2.00 net.

This book should be useful to workers of many kinds. It takes up the subject of optics where the ordinary college manual lays it down, and deals with those problems a man has to face when in the office and in the works he tries to put his scientific knowledge into practice. But it approaches them from the scientific side and not as a mere workshop handbook.

Quite candidly the author acknowledges that he has merely outlined his subject, but he has done so in a very masterly manner. A considerable portion of the book is taken up with the theory of aberrations of the third order and the design and testing of optical systems. Problems relating to photometry and colour perception come next in order of importance, while polarization, photography, and interferometry receive ten pages each. But it would be difficult to put more useful information into those ten pages.

The lists of original papers are valuable so far as they go, but it must not be supposed that they exhaust the subject or even cover the ground completely.

G. J. BURCH.

Ophthalmic Surgery. By Dr. JOSEF MELLER. Edited by Dr. WILLIAM M. SWEET. With 173 original illustrations. Second edition, thoroughly revised. London : Rebman, Limited, 129, Shaftesbury Avenue, W.C., 1912. Price,

A hearty welcome to the second edition of Dr. Josef Meller's "Ophthalmic Surgery," which, as most folk are aware, contains an account of the operations commonly performed upon the eye and its appendages at Professor Fuchs's *Klinik*, in Vienna.

In the new edition, edited by Dr. William M. Sweet, of Philadelphia, the text has been rewritten, and the matter re-arranged, and many new illustrations have been added, and yet the book is not thirty pages larger than was its predecessor of four years ago.

At the Fuchs' *Klinik*, whenever possible, general is replaced by local anæsthesia. For operations on the eyeball nothing is believed to surpass cocaine, 3 per cent. For glaucoma, however, as well as for the passing of lacrymal probes, and removing foreign bodies from the cornea, alypin, 3 per cent., is preferred, since it does not, like cocaine, cause dilatation of the pupil and thereby inconvenience the patient. Excision of the lacrymal sac is performed after the injection of 1 c.c. of 1 per cent. cocaine and 1:1,000 adrenalin or suprarenal solution. Tenotomy is usually carried out under anæsthesia of the conjunctival sac alone, supplemented, in nervous subjects, by a subconjunctival injection of cocaine immediately over the tendon of the muscle to be divided. In advancement the needle of the syringe is introduced against the sclera, and the cocaine is injected along the axis of the muscle.

The eyeball is often enucleated under the anæsthesia secured by dropping cocaine into the conjunctival *cul-de-sac*, together with the injection of a 1 per cent. solution into Tenon's capsule and the neighbourhood of the optic nerve. Elschmig's so-called "ganglion anæsthesia" is, however, superior to the other methods for this operation. It consists in injecting a Pravaz' syringe of a 1 per cent. solution of cocaine into the vicinity of the ciliary ganglion, after the conjunctiva has first been rendered insensitive by several instillations of 3 per cent. cocaine. In timid and excitable patients, general anæsthesia with scopolamine and morphine, injected three hours and again fifteen minutes before operation, may be adopted. Then, a few whiffs of ether or chloroform

may be administered, or "ganglion anæsthesia" may be employed, or the eye may be simply rendered insensitive by means of a little cocaine.

After all, there is something to be said in favour of adopting the custom common in these islands of simply enucleating the eyeball under the general anæsthetic influence of ether or chloroform. The question, when all is said or done, is not altogether one of pain.

The section dealing with the surgical treatment of glaucoma reaches an excellent modern standard. It now includes a good account of Lagrange's sclerectomy and irido-sclerectomy. The naked-eye appearance of a filtration-scar after the performance of those operations is shown by a beautifully coloured plate introduced into the text. Scleral trephining has a section devoted to it, and the methods introduced by Fergus and by Elliot respectively are both characterised as "modifications of the Lagrange sclerectomy." Herbert's methods are not mentioned. The de Vincentiis' operation, which often exercises a favourable influence upon cases of chronic glaucoma, is described.

To the chapter on glaucoma is appended a very practical account of the Schiötz tonometer, which is now generally regarded as "an accurate and certain means of determining the intra-ocular tension."

As regards extraction of the lens in its capsule, Meller has little to say. It comes to this, so satisfactory are the results obtained in the Vienna *Klinik* by the so-called "combined" operation that intra-capsular extraction is regarded as offering no special advantages. But Meller very fairly and properly states that "our experience of the intra-capsular method is limited to only a few cases, and we can therefore express no opinion of its value." In passing it may be noted that extraction with peripheral iridectomy, as advocated by Chandler, Pflüger, and Hess, with a view of preventing prolapse of the iris and of lessening the risk of glaucoma, is described. It is contraindicated in complicated cataract, and in cataract with thickened lens capsule where removal of the lens and capsule is intended. Moreover, in restless subjects the usual iridectomy is more suitable.

Among operations not included in the first edition, we note Toti's dacryocysto-rhinostomia and Barraquez's method of implanting fat into Tenon's capsule after the enucleation of the eyeball. The few disparaging remarks concerning Motais' operation for ptosis, published in the first edition, are replaced in the second by a full and capably illustrated account of this useful procedure.

One operation that still enjoys a certain popularity in Great Britain, namely, Mules' evisceration with the implantation of a glass sphere in the sclera, is never performed in the Fuchs' *Klinik*. According to our author, cases of sympathetic inflammation have repeatedly been observed, and the spheres often become extruded, sometimes even after years have passed. Although mentioned, the Frost-Lang operation is not done in the Fuchs' *Klinik*.

It is to be wished that corneal section in serpiginous ulcer might no longer be spoken of as the "Saemisch section." The late Mr. G. E. Walker, of Liverpool, demonstrated that Saemisch had been forestalled by twenty-seven years by G. J. Guthrie, while Professor Hirschberg has proved in these columns (*THE OPHTHALMOSCOPE*, 1911, page 672) that the operation was executed by a Copenhagen surgeon, Georg Heuermann, in the year 1765.

A few, but very few, blunders have struck our eye in reading Meller's book. As examples, we may cite "paracentesis" for "paracentesis" (p. 240), "Elliott" for "Elliot" (p. 219), and "Pravez" for "Pravaz" (p. 121). There

is an ambiguity in the use of the word "inferior" in the first few lines of page 125.

The illustrations do what illustrations do not always succeed in doing, namely, in showing the points they are desired to illustrate.

SYDNEY STEPHENSON.

CORRESPONDENCE.

[While THE OPHTHALMOSCOPE will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.]

THE MAYOU-ZORAB OPERATION FOR GLAUCOMA.

To the Editor of THE OPHTHALMOSCOPE.

DEAR SIR,

In the current number of THE OPHTHALMOSCOPE—on page 258—you publish a letter from Mr. Mayou, under the heading "The Mayou-Zorab Operation for Glaucoma."

I do not know what Mr. Mayou's sentiments are on the subject, but I trust you will forgive me for protesting against my name being used, either jointly or singly, to indicate the operation alluded to. My reasons are:—

1. I hold that operations should have names which indicate as closely as possible the nature of the procedure.

2. Naming operations after surgeons, leads, almost invariably to controversies as to priority of claim, of which we have had a surfeit recently.

3. Apparently Professor E. Rollet, of Lyons, was the first to perform the operation, I believe in 1907, *vide* his letter in THE OPHTHALMOSCOPE for July 1912, p. 423.

In my article in your current issue, I have called the operation "aqueoplasty." If anyone can suggest a more descriptive title, I trust it will be generally used.

I am Sir,

Yours, very truly,

ARTHUR ZORAB.

7, CARLTON CRESCENT,
SOUTHAMPTON,
April 2nd, 1913.

SELF-LIT OPHTHALMOSCOPES.

To the Editor of THE OPHTHALMOSCOPE.

DEAR SIR,

I shall be obliged if you will allow me to correct a mistake on the second line of p. 147 in your March issue. The measurements of the sight-holes there given should be 4 mm. long by 1.25 mm. broad.

The matter is one of considerable importance in the use of the instrument or else I should not trouble you.

GOVERNMENT OPHTHALMIC HOSPITAL,
MADRAS,
April 3rd, 1913.

Yours truly,
R. H. ELLIOT,
Lt.-Col., I.M.S.

THE OPHTHALMOSCOPE DIARY.

French Ophthalmological Society.	May 5th	184, Boulevard St. Germain, Paris.
American Ophthalmological Society	May 6th	Washington, D.C.
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	May 7th 8.30 p.m.	1, Wimpole Street, London.
Ophthalmologische Gesellschaft.	May 15th	Heidelberg.
Midland Ophthalmological Society.	June 3rd 4.30 p.m.	Shrewsbury Eye Hospital.
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	June 4th 8.30 p.m.	1, Wimpole Street, London.
Section of Ophthalmology, <i>American Medical Association.</i>	June 17th	Minneapolis, Minn., U.S.A.
Oxford Ophthalmological Congress.	July 17th and 18th	Keble College, Oxford.
Section of Ophthalmology, <i>British Medical Association.</i>	July	Brighton.
Belgian Society of Ophthalmology	Aug. 2nd and 3rd	Ghent
Section of Ophthalmology, <i>XVII. Int. Congress of Medicine.</i>	Aug. 7th to 12th	London.
American Academy of Ophthalmology and Oto-Laryngology.	Nov. 27th	Chattanooga, Tenn., U.S.A.

THE SIGHT TESTS OF THE BOARD OF TRADE.

The following memorial, which received many signatures at the meeting of the Ophthalmological Society held on April 24th last, shows that the sight tests of the Board of Trade do not give the universal satisfaction that seems sometimes to be assumed in official quarters :—

“We, the undersigned, are of opinion that the sight tests of the Board of Trade are not satisfactory, for the following reasons :—

“1. The types used in the form vision test should be printed on a smooth flat surface, preferably of white porcelain, and not on a roll of canvas which has to be held down by the examiner.

“2. The wool test for colour blindness is not an efficient test.

“3. Any lantern used for testing for colour-blindness should have means for regulating the luminosity of the lights shown.

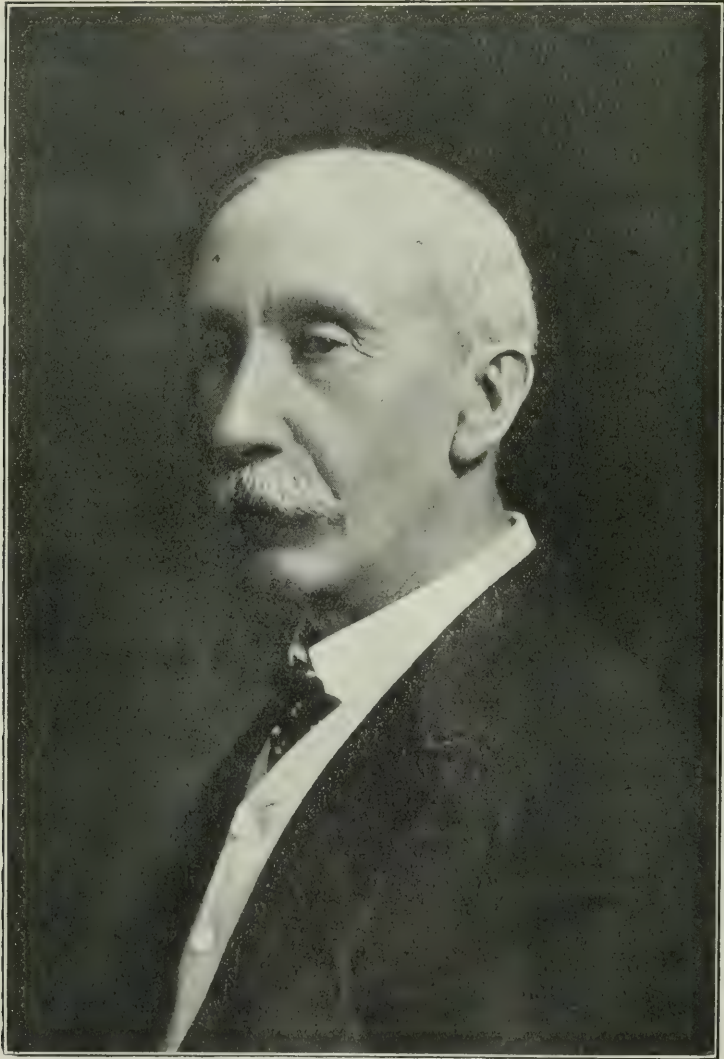
“Anderson Critchett, J. B. Lawford, Walter H. Jessop, E. Treacher Collins, Percy C. Bardsley, C. Devereux Marshall, N. Bishop Harman, H. H. B. Cunningham, Bernard Cridland, R. J. Coulter, Cyril H. Walker, Sydney Stephenson, Priestley Smith, F. R. Cross, J. Gray Clegg, W. T. Lister, S. Johnson Taylor, George Mackay, Rayner D. Batten, F. M. Granger, Henry E. Juler, H. Tomlinson, W. B. Inglis Pollock, Elmore Brewerton, W. Adams Frost, J. Ludford Cooper, Arthur Greene, W. Lang, Ernest Clarke, and F. W. Edridge-Green.”

NOTES AND ECHOES.

Deaths.

OPHTHALMOLOGY has sustained a sad loss in the death, at the age of 70 years, of Sir Henry R. Swanzy, which took place at Dublin on the 13th of April last. Swanzy represented the old guard, having been private assistant to von Graefe in Berlin. He had also served as surgeon in the Prussian Army in the campaign of 1866. After his return to his native city of Dublin, he devoted himself to eye and ear work. He joined the staff of the National Eye and Ear Infirmary, and was the prime mover in the amalgamation that later took place between that institution and St. Mark's Ophthalmic Hospital. He was senior surgeon to the Royal Victoria Eye and Ear Hospital, as the new hospital was called, as well as its honorary secretary. In 1888 Swanzy delivered the Bowman Lecture of the Ophthalmological Society, taking as his thesis “the value of eye symptoms in the localisation of cerebral disease,” a subject upon which he was particularly well qualified to speak. From 1896 to 1898 Swanzy held office as oculist to the Lord Lieutenant in Ireland. From 1897 to 1899 he was President of the Ophthalmological Society of the United Kingdom, an office that he filled with no little acceptance and dignity. Swanzy's connection with the Royal College of Surgeons of Ireland was long and close. It began

in 1873, when he became one of its Fellows. From 1906 to 1908 we find him occupying the presidential chair, and it was during his term of office that the honour of knighthood was conferred upon him. Swanzy was the recipient of honorary degrees from the Universities of Dublin and of Sheffield. His was a well-known and very welcome figure at foreign ophthalmological congresses, particularly at Heidelberg. Finally, Swanzy had been selected to act as president of the ophthalmological section of the International Medical Congress which meets in London in August next.



SIR HENRY R. SWANZY.

Sir Henry Swanzy possessed a charming personality. His was, indeed, a happy blend of sensibility and humour. Of the many tales that cluster around his name none perhaps is better than that related by a writer in a

recent number of the *British Medical Journal* (April 19th, p. 859). A medical student who consulted Swanzy about his eyes enquired his fee. "Nothing," said Swanzy, "dog does not eat dog." The student explained that he was not yet qualified. Sir Henry's reply was, "Neither does dog eat puppy." Many readers will recall his happy toast at a banquet given some years ago to a colleague distinguished, among many other things, for his work on glaucoma: "Here's to, may his circumlental space never grow smaller." In debate Swanzy was always incisive and often humorous. He was once described by a not unfriendly critic as "an acid Don Quixote," and the phrase includes more than the proverbial grain of truth.

Another prominent ophthalmologist, Dr. Cecil E. Shaw, of Belfast, who for several years has been in a precarious state of health, died, we regret to say, on April 10th last, aged 49 years. Dr. Shaw studied in London, Vienna, and Paris. Among his appointments he held those of ophthalmic surgeon to the Mater Infirmorum Hospital and assistant surgeon to the Belfast Ophthalmic Hospital, and lecturer on ophthalmology in the Queen's University. He was an indefatigable worker in the British Medical Association. His services as one of the honorary secretaries of the meeting of the Association held in Belfast in 1909 will be fresh in the memories of readers. Dr. Shaw was the author of a treatise on the diseases of the eye, published in 1895, and was the joint author of Barnett's "Accidental Injuries to Workmen."

* * * *

Mr. M. M. McHardy's
Will.

MR. MALCOLM MCHARDY left estate valued at £18,906 gross, with net personality *nil*. On the termination of certain life interests, or after the lapse of twenty-one years after his death, he left the ultimate residue of his estate to the treasurer of the British and Foreign Blind Association, requesting him, but without imposing any legal obligation, to make over the said residuary estate for the benefit of the said association, to be known as the "McHardy Bequest." Should he have formed a hospital or home in his lifetime, he desired his son and niece to continue the same, and if not, then he desired that his premises in Cliftonville-avenue, Margate, shall be made into a home for paying patients suffering from surgical tuberculosis or in need of preparation for surgical treatment, except patients suffering from lupus or phthisis.

* * * *

AT a meeting of the Board of Management of the Birmingham General Hospital, held on April 4th, an illuminated address was presented to Mr. D. C. Lloyd-Owen upon his retirement from the active staff and in consideration of his valuable services to the hospital since September, 1898. At the annual meeting of Governors Mr. Lloyd-Owen was unanimously elected Honorary Consulting Ophthalmic Surgeon to the Hospital.

* * * *

Mr. George Mackay. MR. GEORGE MACKAY has been appointed consulting ophthalmic surgeon to the Edinburgh Royal Infirmary upon the expiration of his term of office as ophthalmic surgeon thereto. At a meeting of the managers of the institution their high appreciation of Mr. Mackay's twenty-four years' service in the infirmary was recorded.

* * * *

Ophthalmological Society of the United Kingdom THE following office bearers were elected at the meeting of the Society held on April 24th last: *President*, F. Richardson Cross; *Vice-Presidents*, Percy Flemming, P. W. Maxwell, W. M. Beaumont and J. B. Lawford; *Treasurer*, James Taylor, M.D.; *Council*, H. Herbert, G. Brooksbank James, Leslie J. Paton, Stephen Mayou, A. L. Whitehead and E. W. Brewerton; *Secretaries*, Gordon M. Holmes, M.D., and George Coats.

* * * *

British Medical Association. THE subjects chosen for discussion at the ophthalmological section of the British Medical Association at Brighton, on July 23rd, 24th, and 25th, 1913, are:—

1. The question of excision in cases of injury to the eye.
2. School clinics and the prevention of myopia.
3. The treatment of chronic dacryocystitis.

Members wishing to take part in the discussions or to read papers are requested to communicate with W. H. Brailey, 21, Lansdowne Place, Hove.

THE OPHTHALMOSCOPE.

A MONTHLY REVIEW OF CURRENT OPHTHALMOLOGY.

VOL. XI.—No. 6.]

JUNE 1, 1913.

[TWO SHILLINGS.

CONTENTS.

Original Communications.—

	PAGE
1. Lieut.-Col. R. H. Elliot, I.M.S.—Some additional notes on Sclero-Corneal Trephining	324
2. N. Bishop Harman, M.B., F.R.C.S.—A Scheme for the exact record of Fundus Changes in Myopia	335
3. Arthur J. Ballantyne, M.D.—Pulsation of the Retinal Arteries (continued)... ..	338
4. G. F. C. Wallis, M.D.—Interstitial Keratitis (congenital syphilitic) treated with Salvarsan	342

Clinical Memoranda.—

1. C. G. Russ Wood, F.R.C.S., and Frederick A. Anderson, M.D.—Guaiacol Diaphoresis in Ophthalmology	347
2. Lieut. H. C. Craggs and Assistant-Surgeon C. G. Taylor.—A Research into the relation between Systemic Blood Tension and Raised Intra-ocular Tension	350
3. E. F. Drake-Brockman, F.R.C.S.—A note on Extraction of Cataract by rupturing the Capsule antecedent to the section through the Cornea	351

Current Literature.—

I. Pathology (third notice)	353
II. Ophthalmology and General Medicine	357
III. Buphthalmos	364
IV. Researches upon Ocular Syphilis	365
V. Operations for Glaucoma	365
VI. Sundry communications on Glaucoma	367
VII. Parinaud's Dermo-epithelioma	369
VIII. Conical Cornea	370
IX. Remedies (fifth notice)	371

Book Notices	377
---------------------	-----

Correspondence	381
-----------------------	-----

Notes and Echoes	382
-------------------------	-----

The Ophthalmoscope Diary... ..	388
--------------------------------	-----

ORIGINAL COMMUNICATIONS.

SOME ADDITIONAL NOTES ON SCLERO-CORNEAL TREPHINING.

BY

LIEUT.-COL. R. H. ELLIOT, I.M.S.,

MADRAS, INDIA.

Introduction.

LAST January I submitted my report as one of the openers of the discussion "On Glaucoma Operations with Special Reference to the Comparative results attained by Iridectomy and its Recent Substitutes" which is to take place before the XVIIth International Congress of Medicine in London in August next. Since doing so, I have received a number of personal communications from various surgeons, directing my attention to points which they consider I have omitted to emphasise, or concerning which they are in disagreement with me. In addition to this, several controversial questions of interest have been raised in ophthalmic journals, both in Great Britain and in America. I have felt that much valuable time will be saved, from my point of view at least, if I am able to deal in advance with some of these questions. The subject is so large and the time so limited that even an opener of the discussion cannot do justice to his views. I have no wish to make use of any artifice of debate, or to "spring" any new view on the Congress at the last moment, and the following notes represent an effort, in the light of what has so recently been written, to place my case as clearly as possible before ophthalmic surgeons prior to the commencement of the discussion.

My confidence in trephining is founded on an experience of nearly 900 cases operated on in Madras since August, 1909. This experience has brought to my mind the firm conviction that the sclero-corneal operation provides a safe, easy, and rapid method of dealing with nearly every form of glaucoma, from the most chronic to the most acute. I cannot, however, expect every one to share that opinion at present, and in the fixed belief that *magna est veritas et prevalebit*, I desire to do everything that will promote a full and open discussion.

I am indebted to the Editor of THE OPHTHALMOSCOPE for once again extending to me the hospitality of his pages.

Points of importance in the operative technique.

(1) The flap must be large, run roughly concentric with the limbus, and end on either side at a distance of at least 4 mm. from the sclero-corneal junction. If these details be observed, filtering fluid from the interior of the eye finds a free exit, not merely into the limits of the flap, but also into the whole area of the intact conjunctiva. The advantage of this is obvious, and the subject has been fully dealt with in my recent book.*

(2) The cornea must be split at the middle of the base of the conjunctival flap, in order to allow the trephine to be placed *as far forward as possible*. To put this in other words, the conjunctival layer of the cornea must be detached from the deeper layers of that tunic over an adequate but limited area. The last clause may be dealt with first. It is not necessary to carry

* "Sclero-corneal Trephining in the Operative Treatment of Glaucoma." Geo. Pulman and Sons, Ltd., Thayer Street, London. 1913.

this splitting of the cornea far round its circumference, nor to interfere unduly with the angles of the wound; all we require to do is to expose a sufficient area on which to plant the trephine. There are two very distinct disadvantages in exceeding these limits, *viz.*, (i) we thereby contravene one of the first principles of surgery by making an incision of unnecessarily large size; and (ii) we loosen the lateral attachments of our flap, and we find in consequence that it does not tend to lie in position at the end of the operation, as a well-modelled flap will do. The result may be that the flap may become displaced during convalescence, or may require a stitch at the close of the operation.

To return now to the main issue, "splitting of the cornea," proves much easier than would at first sight seem possible. One must admit that it is a delicate manœuvre, which requires to be carefully performed by a surgeon with good near-sight and steady hands; but is not the same true of most other eye operations? At the Oxford Ophthalmological Congress of 1911, I had the privilege of demonstrating the method to a large number of the members. Up to that time Western surgeons seemed to think that "the crescent of split cornea" I had described was a figment of my imagination, although many operators out here in India had learnt to practise the manœuvre without difficulty, possibly because they had started without any pre-conceptions on the subject. I have since heard that a number of those who were present at the Oxford Congress have subsequently adopted "splitting of the cornea" in their trephine operations without difficulty. One further piece of evidence is of value. Since my return to Madras in November, 1911, I have insisted that all who learn trephining there must practise this manœuvre as a routine step of the trephine operation. Of our ten visitors during this period, not one has had any real difficulty in becoming expert in this part of the operation. It is freely admitted that the operation, as now performed, is more delicate and more difficult than that in which we were content to expose the overhanging limbus, and trephine just outside its limits, but the contention is that the difficulty of the manœuvre has been greatly over-estimated, and that anyone with good manipulative dexterity need not hesitate to undertake the newer procedure.

My reason for laying so much stress on this small variation of the *technique* is that I believe the point to be crucial. One may, and often can, trephine successfully outside the limbus, but if one desires to operate *with an assurance of success*, one must place the trephine hole as far forwards as possible. Only thus can one be confident of a direct entry into the anterior chamber, unhampered by any adhesions which may happen to be present between the iris base and the corneal periphery.

We have endeavoured in Madras to ascertain the breadth of the zone available for trephining in eyes in which no irido-corneal adhesions exist, and in which the conjunctiva has been dissected up to, but not beyond, the limbus. Measurements of normal eyes, taken in various ways, seem to indicate that the space available for trephining (*i.e.*, the space between the angle of the chamber and the level of the limbus) is never more than 2 mm. in breadth and is often 1.5 mm. or even less. It is doubtful if we can, in the average Indian eye, rely on more than 1.7 mm. It is thus obvious that if we work with a 2 mm. trephine, and neglect to dissect the flap up beyond the limbus, some part of our trephine hole will lie over the ciliary body, even in the absence of irido-corneal adhesions, whilst if such adhesions are present, it will obviously be impossible to avoid implicating the uveal tissue. On the other hand, we have found that we can *always* expose a corneal crescent 1 mm. in breadth, even in the most difficult cases, whilst in ordinary operations the measurement runs from 1.5 to 2 mm. Two facts

will illustrate the cardinal importance of this subject.—(i) Since we have adopted "splitting of the cornea" as an invariable routine step in every trephine operation performed in the Madras Hospital (whoever the operator might be), we have never once, in 325 consecutive cases, failed to effect a direct entry into the anterior chamber with the trephine; and (ii) complications involving the uveal coat have practically disappeared from our theatre experience, save only for occasional instances in the experience of learners of the operation in their earlier cases. The great importance of this can only be gauged by those who remember the frequent anxieties that overhung the older form of operation due to presentation of some part of the uveal coat in the trephine aperture.

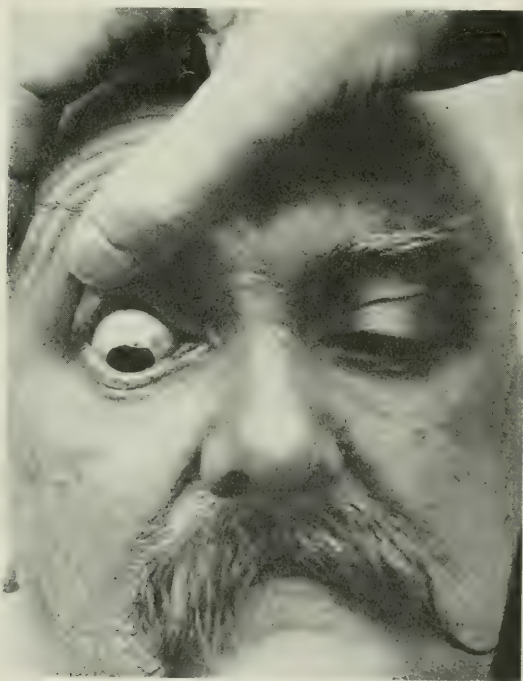


FIG. 1.

T. S.

Over four months after operation. Notice invasion of cornea and dark trephine-hole.

An objection that occurred to us in the early days of "splitting of the cornea" was that the close attachment of the conjunctival layer to the deeper structures would cause those parts to become early and firmly re-united, and that the corneal area of the wound would in consequence be lost for filtration purposes. Experience has shown such fears to be utterly groundless, as the accompanying photographs (Fig 1-4) will prove to demonstration; the corneal filtering area can be well seen in all the pictures, which are merely a few of the very many we could have taken. I am indebted to Assistant-Surgeon Taylor for them.

(3) Some American surgeons have advocated the substitution of the "sliding flap" for the one I have recommended, and if I am not mistaken, the underlying idea has been that the "Elliot flap," as they call it, is in great danger of being button-holed. I have already said that I consider the

difficulties of this manœuvre to have been greatly exaggerated. In the last 124 consecutive operations, performed by ten other operators in Madras, since my return to India (November, 1911), button-holing occurred seven times (in 5·6 per cent.), and on only one such occasion was it found necessary to replace the flap and to trephine in another segment of the eye. All the cases did well, the course being apparently uninfluenced by the accident. During the same period I find that I trephined 201 consecutive eyes, and on four occasions (in 1·98 per cent.) made a tiny button-hole, which in no instance had any detectable influence on the satisfactory progress of the cases. I have formed the deliberate opinion that a small button-hole is not at all a serious complication. On this point I have consulted Major Kirkpatrick, whose numerical experience of trephining is probably second only to my own, and he has kindly permitted me to say that he fully endorses the views I have expressed above. These are negative considerations, but, to my mind at least, there are three very serious positive objections to the sliding flap, *viz.*: (i) If the trephine hole is placed as near the limbus as possible, the line of union of the flap will inevitably cross the hole, and there will therefore be a risk of the latter being involved in, and partially closed by, the resulting cicatrisation, thus defeating the ends of the operation. (ii) The sliding flap necessitates the insertion of sutures, which are quite unnecessary if my *technique* is adopted. A complication of the operation and a possible source of infection are thus needlessly introduced. (iii) The use of a sliding flap commits the operator to placing his trephine hole outside of the limbus; in other words, it renders what I have described as the most crucial point of my *technique* impossible of execution. I have, however, dealt with this so fully that I need not return to it. An operator may use a sliding flap and trephine, but he cannot, unless I have misunderstood the method, make a *sclero-corneal* trephining, and on this everything turns.

(4) An iridectomy should be made, as a routine step, in every trephining operation, simply to avoid the risk of iris tissue becoming impacted in the trephine aperture during convalescence. The rôle of an iridectomy in this operation is the same as it is in the combined extraction of a cataract: no more and no less. It provides a sluice-gate through which rushes of escaping fluid can take place, without carrying the iris in front of them on their way out. I have fully described in my book (*loco citato*) the new method we have adopted for the performance of the necessary iridectomy; the consequences of this manœuvre have proved so far-reaching as to demand farther notice here. It is well-known that the trephined disc practically always remains attached at one point to the scleral coat by a narrow hinge; it will also be found that, when we split the cornea and thus place our trephine hole far forward, the free edge of the iris bulges into the opening in almost every case. The disc, hinged at one point, is pushed to that side by the bulging bead of iris, and it is an easy matter to include both disc and iris in one grip of the forceps, and to divide both together with a single snip of the scissor points, thus performing our iridectomy with the same cut that severs the hinge. The great advantage of this is that our grip of the disc steadies the eye, and effectively prevents even a troublesome patient from rotating it until after the portion of iris has been removed. We are thus enabled to avoid all risk of the uveal tissue being dragged into and so becoming impacted in the trephine hole.

There can be no question that impaction of uveal tissue in the trephine hole constitutes a grave complication of a case of trephining. In the first place, it tends to block the hole mechanically; and, in the second, it is liable to lead to a later obstruction, owing to the proliferation of inflammatory connective tissue. Important considerations arise from both these points. If we avoid all drag

on the iris during the iridectomy, we eliminate the main cause of impaction of the uveal tissue; whilst if we place our trephine far forward, we avoid the undesirable neighbourhood of the ciliary body and of the adherent iris base, and we have therefore to reckon only with *free* iris tissue, which we can easily remove from the propinquity of our aperture. Our determination to use a 2 mm. trephine was based on the fact that we found it difficult to handle an impacted iris in any smaller wound; there was not room enough to use forceps in. Under the changed conditions of an anterior wound, and of the new manœuvre for steadying the globe during the iridectomy, there seems to be no



FIG. 2.

Mrs. B. B.

Five months after operation. Notice extensive invasion of cornea in both eyes.

objection to the use of a smaller trephine, for *iris complications have now practically vanished from our theatre experience*. Quite a number of our early cases in which a trephine smaller than 2 mm. in diameter (1 mm. to 1.5 mm.) was used, have returned with free and abundant filtration, with a maintenance of lowered tension, and with satisfactory visual results. Our strong inclination under the circumstances is to revert to the use of a smaller trephine. Probably one of 1.5 mm. diameter will prove the most useful.

The modern operations for Glaucoma.

The time has now come when surgeons may judge the modern glaucoma operations from the standpoint of scientific surgical principles, and endeavour to formulate the conditions which they should aim at in fulfilling the performance of a sclerectomy. Once this has been done we can proceed,

in the light of the conclusions so reached, to study the various operations now before the profession, with a view to determine which of them best recommends itself for adoption.

The following list represents an effort in the direction indicated :—

(i) The filtration produced should be sufficiently free, and permanent in character; (ii) the piece of sclera or of corneo-sclera removed should be as small as possible, consistent with the maintenance of efficient and permanent filtration; (iii) the method of removing the piece of the ocular tunic should be such that no tissue is "cut to waste"; in other words, every scrap of the space occupied by removed tissue should be made available for the filtering channel provided; otherwise, there will ensue a needless weakening of the coats of the eye; (iv) it should be possible (*a*) to determine beforehand the exact dimensions of the portion of the ocular tunics to be removed, and (*b*) to give exact mathematical effect to that determination when the time comes to translate it into operative action; (v) the risk of the operation should be reduced to a minimum; (vi) the *technique* should be made as easy as possible, consistent with efficiency; and (vii) the performance of the operation should not, in the event of failure, be a bar to its repetition, or to the selection of some other operative procedure in its stead.

If the foregoing conditions are accepted, we may proceed to examine the various operations now in vogue, taking each clause in turn.

I commence with **Sclero-corneal trephining**.

(i) We have under our observation a number of cases in which uninterrupted filtration has been going on for periods varying from two to three and a half years, without mentioning those of shorter duration. The size of the disc removed in these cases has varied from 1 mm. to 2 mm. The tension of the eyes has shown no tendency to rise above normal, and the freedom of filtration is clearly demonstrated by the presence of a corneo-conjunctival bleb in each case. We may therefore fairly conclude that permanent filtration has been established.

(ii) It is hardly possible to understand how a smaller scleral resection can be made than that represented by a circular disc 1 mm. to 1.5 mm. in diameter; and yet we have shown that if the cornea is split, and the iridectomy is performed according to our latest *technique*, there is no difficulty in obtaining permanent filtration by the removal of this very tiny piece of tissue. The contention, put in other words, is that the size of the sclerectomy has been reduced to the smallest possible.

(iii) A cylindrical piece of corneo-scleral tissue is neatly removed by the trephine, leaving a clean-cut, straight-walled canal of the desired size, of uniform calibre throughout, and running perpendicular to both surfaces of the ocular tunics. Could the conditions be more ideally fulfilled?

(iv) By varying the diameter of the trephine, the size of the sclerectomy can be arranged with mathematical accuracy. One can start a trephine operation with the absolute certainty of making a hole in the ocular tunics of the exact size determined on, before the patient leaves his bed for the operation table. This surely makes for operative accuracy.

(v) No one can afford to overlook the question of safety in a glaucoma operation, and although the arguments advanced in this section will appeal to a surgeon in inverse ratio to his operative experience, they are, none the less, such as must be weighed even by the most expert. In trephining we *perform our actual sclerectomy on an eyeball which is to the last moment closed, and distended with fluid*. The deeper parts are thus obviously greatly protected. Moreover, all the structures of the globe, and not the least in importance, the lens and the vitreous body, enjoy to the latest possible moment, their full

integrity, their usual position, and their accustomed support. Yet another point, namely, the trephine wound is made as far away as possible from the angle of the chamber, thus minimising the dangerous possibilities of interference with the ciliary body or with adherent iris-base. This subject has already been dealt with, and I would return to it only to say, that my fear of complications arising from such interference grows with every year of operative experience. It is my deliberate opinion, that every possible effort should be made to give this very "dangerous area" as wide a berth as possible.

There is a last point of such importance as to demand a separate paragraph. In dealing with cases of acute glaucoma, various writers have recommended that before any other operation is attempted, the tension of the eye should be lowered by performing a posterior sclerotomy, and thus draining off some of the excess fluid in a gradual manner. It has been recognised that the slow reduction of the tension, and the protection afforded by the fact that the wound or wounds in the scleral coat are very small, are two factors which make powerfully for safety in such cases. The same argument applies to those late chronic cases of glaucoma, in which the height of the tension and the state of the vessels make an intra-ocular hæmorrhage a pressing danger. *I claim for trephining that, by virtue of the small aperture made, it approaches more nearly to the conditions, and therefore to the implied safety, of a sclerotomy than does any other form of sclerectomy.*

(vi) It has already been urged that the operation of sclero-corneal trephining is not a difficult one. We can now count by tens the surgeons who have learnt to trephine in Madras, and are in the position to say that not a single one of them who has been able to perform, or to learn to perform, ordinary intra-ocular operations has had any real difficulty in acquiring the *technique* of this procedure.

(vii) With our new *technique* we seldom find a second trephining necessary; but in our earlier experience we have trephined the same eye on a second and even on a third occasion, or have resorted to some other form of operative procedure when we found trephining had failed. Later trephinings have sometimes proved successful when the first attempt had disappointed us.

I pass on next to the erstwhile classical **iridectomy of von Graefe**, and I believe I am not alone in maintaining that this operation is only of value when it leads either to the establishment of a permanent filtration, or, at any rate, of a filtration which goes on long enough to allow the normal conditions of the eye to be re-established for a time at least. It is, in my experience, practically useless in chronic glaucoma, and less certain than trephining in acute glaucoma. Where, however, it is most open to attack is on the ground of safety. We have to take into account the large scleral wound made, and the fact that this lies close to the ciliary body. The sudden release of all tension and the simultaneous weakening of the supports of the lens and vitreous body create very unfavourable conditions under which to make the crucial step of the operation. I never hesitate to say that, even under favourable circumstances, it is harder to teach a learner to make a neat, clean iridectomy, than it is to teach him to perform a cataract extraction or any other eye operation. The man who can make a "finished iridectomy" quietly and cleanly has graduated as an ophthalmic operator. Not the least of his difficulties is the management of the sharp point necessarily introduced into the anterior chamber. When to the initial difficulties we add all that an iridectomy for glaucoma implies, we constitute an operative procedure which even the boldest never undertakes lightly, and which by comparison makes trephining seem a safe and easy operation.

On **Herbert's operation** I diffidently offer two criticisms of a tentative

nature, *viz.*: (i) I think it doubtful whether this method gives the same assurance of permanent filtration that trephining does (this seems to be the experience of others also), and (ii) it is, to my mind, a grave objection that the incision is made so near to the ciliary region and to the iris base.

I come now to **Lagrange's operation**, and in discussing this procedure I write with the greatest deference for its distinguished author, to whom surgery owes so much. He has been the pioneer of sclerectomy, and if I now venture to criticise his *technique*, I trust that he will accept my assurance that I do so with the motive of avoiding any misunderstanding at the Congress, and of affording him the most ample opportunity, should he honour me by availing himself of it, of answering what I have now to say. I cannot doubt that Professor Lagrange has given the questions I am about to raise his earnest

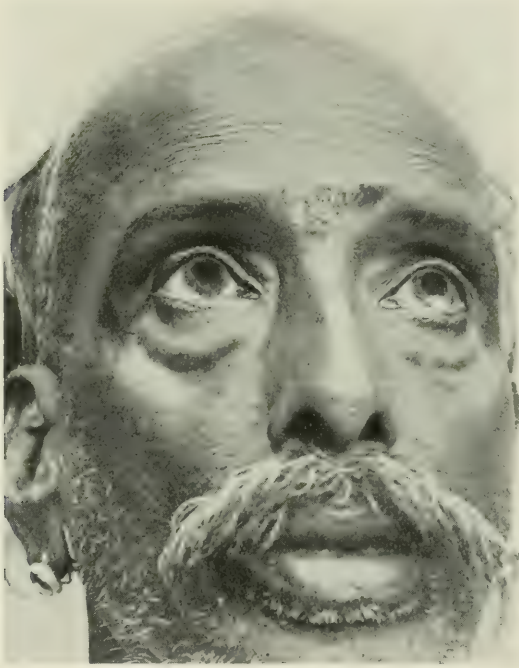


FIG. 3.

Ramanadha Modali.

3½ years after operation; trephined below left eye. Notice the invasion of the cornea by the filtering bleb.*

and careful attention, and as they have arisen in many minds besides my own, his answers to them cannot fail to be of deep and abiding interest to surgeons all the world over. In this light alone, I put forward the following propositions:—

(i) The Lagrange method is open to the objection that it demands the making, in the first instance, of a scleral wound which is far larger than that which the surgeon contemplates as permanently necessary.

(ii) The actual sclerectomy is performed on an eye which has *already been laid open to this wide extent*. It is a widespread experience that every moment

* The negative has been retouched to show clearly the outline of the cornea in each eye. None of the other negatives or prints has been retouched in any way.—R. H. E.

of such an operation is fraught with the dangers of accident to the lens or vitreous body, or of intra-ocular hæmorrhage, and is full of anxiety to the surgeon.

(iii) The wound made in the second stage of the operation, in resecting the piece of sclera, is spindle-shaped, tapering off at each end; in consequence, a part of each end of it will be sacrificed by primary union. It is obviously the intention that the ends of the original knife-incision should become re-united, and to this attention was directed in paragraph (i) above; but our present point is, that over and above this, the union invades the *sclerectomy* wound itself. An inspection of Lagrange wounds, whilst in process of healing, will demonstrate this. It is difficult to say how far this healing will extend, and although we lay little stress on the possibility of resulting astigmatism, it is obvious that we have here a factor which makes the exact gradation of the size of the wound very uncertain.

(iv) This uncertainty is accentuated by the difficulty the surgeon finds in excising, according to the *technique* of this operation, a piece of sclera of the exact size which he desires to remove. In the experienced and able hands of Professor Lagrange, this difficulty has doubtless long ceased to exist, but it is a very real one for the average surgeon in whose practice it involves a want of scientific accuracy in the results obtained.

(v) The scleral wound (*vide* Professor Lagrange's drawings) is triangular on cross-section, the base of the triangle lying beneath the conjunctiva, and the apex against the angle of the chamber. The filtering channel is therefore much wider at its outflow end than at its inflow: if the deep end of the channel is wide enough for the purpose of filtration, the conjunctival or outflow end must be needlessly wide, and an unnecessary weakening of the scleral tunic must be involved; and *vice versa*.

(vi) The first incision lies over the neighbourhood of the ciliary body and of the iris base, a condition to which my objections have already been stated.

To summarise my objections to the *technique* of the Lagrange operation: the original incision is unnecessarily and dangerously large, and is placed over a dangerous area; exact gradation of the piece of sclera removed is difficult; and, lastly, the channel made is mechanically incorrect.

I owe my thanks to Major Kirkpatrick for the valuable help he has given me in my comparison of the various operations.

MADRAS, INDIA.

April 14th, 1913.

APPENDIX.

Short abstracts of a few of the cases watched for comparatively long periods.

(1) Ramanadha Modali, male, Hindu, age 50, operated on August 24th, 1909, for primary chronic glaucoma. A typical case. R.V. = hand movements, L.V. counts fingers at 2 m. T = + 2 R.E., + 1 L.E. (4 and 5.25 mm. Maklakoff tonometer).

Operation on August 24th, 1909. Trephined under local anæsthesia, trephine-diameter 1.5 mm., iris bulged into wound and was excised, aqueous escaped freely, iridectomy peripheral. Convalescence uninterrupted. T. low both eyes (5.25 mm. R.E., 7 mm. L.E. Maklakoff). Discharged September 4th, 1909, R.V. = hand movements, L.E. counts fingers at 2 m.; filtration free; pupils central. Seen again on eight occasions at short intervals up to February 21st, 1913. On the last occasion, $3\frac{1}{2}$ years after the operation,

R.V.=hand movements, T.=25 mm. Hg. (Schiötz); L.E. counts fingers at $2\frac{1}{2}$ m., T.=18 mm. Hg. (Schiötz). The appearance of cupping was still marked. It will be noticed that the vision had been maintained in the R.E. and been slightly improved in the left eye. There had been no change for the worse in the media of either eye. (See Fig. 3).

(2) Pokar Doss, male, Hindu, age 35 years. Chronic congestive glaucoma. History and clinical condition typical. R.V.=hand movement. L.V.=5/60, with -2D. sph. = 6/36, T.=+1 (5 mm. Maklakoff), R.E. had been subjected to an iridectomy elsewhere, and the patient declined an operation on it. L.E. trephined on April 21st, 1910, under local anæsthesia, trephine diameter 2 mm., iris prolapsed into wound

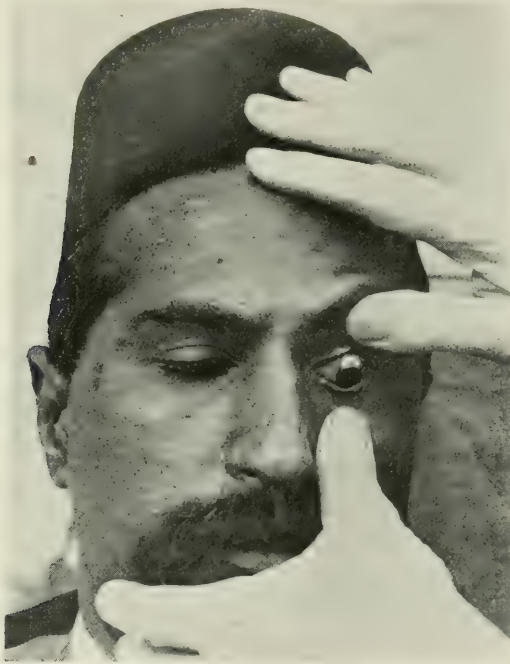


FIG. 4.
Pokar Doss.

Three years after operation. Notice prominent bleb, invasion of cornea, and dark trephine-hole.

and was excised (a broad complete coloboma), aqueous escaped freely. Patient discharged on May 18th, 1910, with normal tension and free filtration. Last seen on April 9th, 1913, R.V.=O, L.V.=6/36, filtration free, marked cupping still seen, T.=16 mm. Hg. (Schiötz). Thus, the iridectomised eye had lost all vision, whilst the trephined eye *three years after operation*, had slightly improved in vision and showed a tension distinctly below normal. (See Fig. 4).

(3) C. Ramaswamy Asari, male Hindu, age 40 years. Chronic congestive glaucoma. History and appearances typical. R.E. counts fingers at 1.5 m. field contracted on all sides, T.=+1 (5 mm. Maklakoff). L.V.=O, T.=+2 (4 mm. Maklakoff), eyes congested at the time of operation and in a state of subacute glaucoma; secondary cataract both eyes. August 18th, 1910, both

eyes trephined under cocaine, trephine diameter 1.5 mm., iridectomy performed on right eye and iris left untouched in left eye. Discharged on September 5th, 1910. R.E.T.=low, V. with -1.5 D. sph.=5/30, L.E.T.=low, and V.=hand movements. Last seen on February 4th, 1913, *two years, five months, sixteen days, after operation*. R.E. counts fingers at 4 m., T.=15 mm. Hg. (Schiötz), L.V.=hand movements, T.=12 mm. Hg. (Schiötz). There is a marked filtering cicatrix in both eyes.

(4) L.M., a prominent government official, developed chronic glaucoma in the L.E. early in 1910, and was iridectomised in London. The resulting coloboma was perfect. R.E. showed suspicious cupping on August 19th, 1910, with contraction of the field; V.=6/6. R.E. trephined on September 19th, 1910, as the signs of glaucoma were advancing; trephine-diameter 1.5 mm., section above, a portion of the deepest layer of the scleral disc was left; iris did not present, and was not touched. Filtration had ceased around the iridectomy wound in the left eye, and trephining was suggested for that eye also, but declined.

The patient went home and consulted Mr. Sydney Stephenson, who asked me to see the case in consultation when I was in England on leave. The tension had again risen, filtration had quite ceased, and the perimetric field was distinctly flattened. Mr. Stephenson trephined, and the patient did well, the field enlarging rapidly. He has remained under continuous observation up to the present date, *over two years since the trephining of the right eye*. Throughout this time he has continued to carry on the very laborious and responsible work of his office. The tension of the two eyes has remained constant, the R.E. at about 14 mm. Hg., and the L.E. at 12 mm. Hg. The fields have remained normal; under Priestley Smith's test there is in the L.E. a slight relative scotoma at 10°, otherwise both eyes pass the test normally. R.V.=6/5 partly, L.V.=6/9, the blurring due to the wide coloboma in the L.E. accounts for the lowered vision on that side and gives him a certain amount of annoyance. The optic discs have largely regained their normal colour; the cupping is still marked in the L.E. but inconspicuous in the R.E. The media have remained perfectly clear throughout.*

(5) H. M., European, an educational officer, age 54 years, sent by Dr. Verghese, of Calicut, for chronic glaucoma, which had been kept in check for over a year by the use of eserine. History and signs typical of chronic glaucoma. Both eyes trephined with 1.5 mm. trephine, under local anæsthesia, on September 7th, 1910: situation of section above, small peripheral iridectomy R.E., iris not interfered with in the L.E. The anterior chamber of the right eye did not refill till the third day and of the left eye till the thirteenth, convalescence otherwise normal. He has *been under observation by Dr. Verghese and myself for over 2½ years*, the tension has remained low (8 mm. to 12 mm. Hg.), V.=6/5 nearly in each eye, media clear, right field practically full normal, left field very slightly flattened, both eyes filtering freely, pupils central. Continues to use the spherical glasses (+2.5 D.) prescribed by Dr. Verghese three years ago. Patient is quite comfortable and able to do full work.

(6) W. S. B., European, age 39, veterinary surgeon, sent by Dr. Turner for chronic glaucoma, with subacute exacerbations. History typical. When first seen, was recovering under the influence of eserine from a fairly acute attack of congestive glaucoma in the R.E. R.V.=6/18 (3 letters), T.=60 mm. Hg., cupping marked, arterial and venous pulsation on the disc, visual field contracted. He was admitted, a purge given, leeches were applied, eserine was freely

* Patient seen by Mr. Stephenson as recently as May 22nd last. Tension (Schiötz), 25 mm. R.V. (corrected) 6/5. L.V. (corrected) 6/5. Fields for white almost full normal.

instilled, and morphia exhibited. Three days later, on April 4th, 1911, both eyes were trephined, the left, which was quite normal, for prophylaxis alone. A trephine 1·5 mm. in diameter was used, peripheral iridectomy performed, all symptoms relieved; chambers reformed in 24 hours; convalescence uninterrupted. Nine days after operation, the cupping of the right disc was scarcely recognisable, and the arterial pulsation had ceased. T. was then too low to be measured by the Schiötz tonometer; patient has been kept under observation at intervals. The tension of the eyes runs from 10 mm. to 17 mm. Hg.; R.V.=6/5 nearly; L.V.=6/5. When last seen, 15½ months after operation, the media were clear, the fundus of the L.E. remained absolutely normal; in the R.E. there was a rim of normal disc on the outside, the centre of the disc being atrophic and cupped; fundus otherwise normal. Last heard of *over two years after operation*. Continues to do his full work, which not only involves a good deal of office routine, but also much exposure to the sun. He reports everything as satisfactory. He is under continuous medical observation in his own station.

(7) Miss C., a well-known lecturer and writer on Theosophy, age 54, vision had been failing for two years. No history of congestive attacks in the L.E., but suspicious painful attacks in the R.E. R.E. counts fingers at ½ m, T.=25 mm. Hg., L.V., with glasses, 3 letters of 6/6, T.=25 mm. Hg.; appearances of glaucoma typical. Trephined on March 9th, 1911: 1 mm. trephine used in both eyes, situation of section above, iridectomy both eyes. Chambers reformed within 24 hours, convalescence uninterrupted save for hæmorrhage into the R.E., due to an accidental blow. Continues to be reported on by the kindness of Dr. H. Lindo Ferguson, of New Zealand. Last report, 1 year and 10 months after operation, was doing well. R.V.=fingers at 3·5 m, L.V.=3 letters of 6/6; field of vision good; there is no recurrence of glaucoma; filtration remains very free.

A SCHEME FOR THE EXACT RECORD OF FUNDUS CHANGES IN MYOPIA.*

BY

N. BISHOP HARMAN, M.B., F.R.C.S.,

LONDON, ENGLAND.

THERE are a variety of terms in use to describe the fundus appearances in myopia. Some of these are definitive. Others, and they are just those terms that might be expected to be definitive, are loosely used, and, indeed, cannot be used with any degree of exactness.

A very large number of high myopes come under my care in connection with school work in London. Recently, I proposed to examine and classify my records, but at the outset I found that the terms I had used to describe the fundus changes seen, and these were according to the nomenclature in common use, did not convey a sufficiently exact picture of the various cases to permit of a fair comparison. For the year succeeding that observation I have used a definite notation to record the various grades of choroidal atrophy and stretching about the disc. And of the 300 cases on which my observations are based I have been able to re-examine 218 cases with results that will appear below.

* Part of a communication read before the Ophthalmological Society of the United Kingdom on April 24th, 1913.

General fundus states.

In recording the general appearance of the fundus in the subjects of high myopia two terms are in common use and are quite distinctive :

1. *Thin or very thin choroid.*—The term connotes a choroid that has but little pigment, and a defective chorio-capillaris, so that the choroidal veins are visible. The condition is seen in its extreme in albinism. Of the 300 cases examined no less than 57, or 19 per cent., presented this appearance (not including five albinos who were myopic and therefore classed as such).

2. *Irregular Pigmentation.*—Included in this statement is irregularly distributed or patchy pigment, especially in the macular region. In others the pigment is heavy, but seamed by the showing through of the red lines of choroidal veins, giving an appearance of "tigroid striping" or "tesselated" choroid. Forty-one cases were so marked, or 14 per cent., and in many of these the vision was poor out of proportion to the degree of the myopia.

These two states are not essentially characteristic of myopia. They are seen in many other eyes, thin choroids in fair haired children, and tigroid striping amongst the dark haired.

Particular states of the fundus.

The terms "crescent," "annulus," and "staphyloma," (this last as commonly used) would seem to imply a definite degree of choroidal atrophy or stretching about the disc. Unfortunately they do not. Most would agree as to which of these terms should be employed in well defined examples, but there is no agreement, and one's own judgment will vary as to when a "crescent" ceases to be a "crescent" and should be called a "staphyloma." Believing that the changes about the disc would best serve as an indicator of the gravity of the myopia in the greater number of cases, I have used a simple form of grading or notation (Fig. 1) to record these changes about the disc :—

Fundus first degree (F. 1°). A circumpapillary patch of atrophy whose breadth does not exceed half the diameter of the disc.

Fundus second degree (F. 2°). A patch of atrophy, or annulus, the total width of which does not exceed the diameter of the disc.

Fundus third degree (F. 3°). A patch, or annulus, the total width of which exceeds the breadth of the disc.

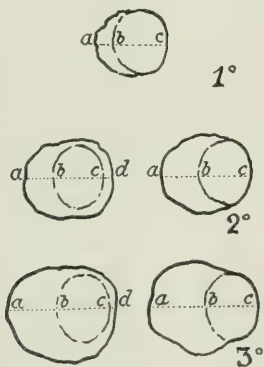


FIG. 1.—Diagram showing scheme for the accurate grading and record of choroidal atrophy at the disc in myopia. First degree (1°), when the breadth of the atrophy does not exceed one-half the width of the disc, ab is less than half bc . Second degree (2°), when the atrophy does not exceed the breadth of the disc : in the right-hand figure ab is slightly less than bc ; in the left-hand figure $ab + cd$ does not exceed bc . Third degree (3°), when the atrophy exceeds in breadth the width of the disc : on the right, ab is greater than bc , on the left, $ab + cd$ exceeds bc .

These three grades are easily remembered ; the measure is readily judged ; and they form a definite basis for future reference. Three grades or degrees seem sufficient, and we are familiar with this division in recording tension.

The chart (Fig. 2) shows the classification of 218 cases after this fashion in comparison with the degree of mean myopia of the two eyes as measured by the retinoscope. It shows that the grading gives a very fair indication of the gravity of the myopia. The proposed correlation of the refraction and the fundus change in myopia will give a double and objective measure of the condition, and in such fashion as to present a picture to one's mental vision.

In the record of any given case there would be added to the figure of the fundus degree any particular change found in the eye, such as nystagmus, vitreous opacities, scattered choroidal atrophy, or macular changes, besides the visual acuity with the correcting glass. *E.g.* :—A fair picture of a case is presented by each of the following records, both of children *æt.* 12 years :—

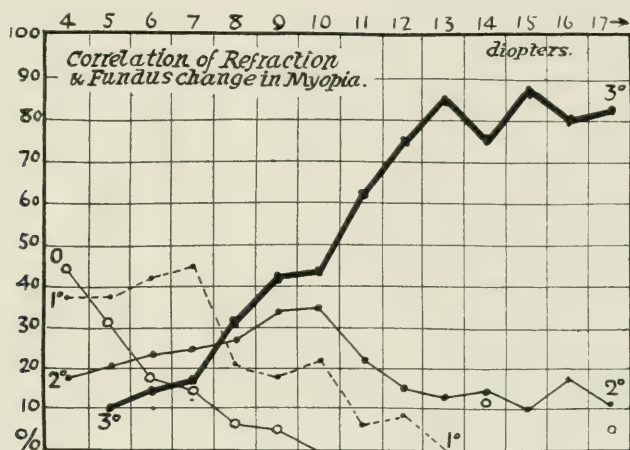


FIG. 2 shows the correlation of dioptries of myopia with the fundus changes seen in 218 cases, and measured according to the scheme shown in Fig. 1. O= no fundus changes seen. The percentage of such cases rapidly declines with the increase of the myopia, but there are exceptional cases at such high grades as 14D. and over 17D. The reversal of the curves is very striking ; in the low dioptries the order of frequency of fundus change is 0, 1°, 2°, 3° ; in the high dioptries it is 3°, 2°, 1°, 0.

1. Myopia 5D. F.1°, V=6/9.

2. Myopia 10D. F.2°, spots in macula, V=6/60.

The utility of the grading is greater than that of accurate record. For those who have to watch the educational progress of myopes it has particular advantages. The following three cases, all of children *æt.* 12 years, each of whom gets 6/12 vision with glasses, give a fair idea of the value of the notation. The first child has a mean myopia of 5D., F.1°. The second has also 5D., but F.2°. The third has 12D., F.3°. The data show that the first case is not of a grave order, so that the child might attend school, provided fine work is eliminated, and periodic observation is kept of the case. The second and third cases are of a more serious order, and the children should certainly receive special educational treatment, such as is provided in the myope classes of London.

I have now used this notation for a year, and find it of great value, particularly for subsequent reference when called upon to advise on the

education of children, in determining what, if any, special methods are required, and what precautions should be ordered, such as exemption from games and sports for boys, and of gymnastics and dancing for both sexes.

The chart gives a very clear view of the increase of the choroidal atrophy about the disc, with the increase of the myopic refraction. There is, of course, no rule in the matter; it is merely an average or serviceable indication. There are cases of extreme and progressive myopia where no changes are seen, but these are rather the exception.

PULSATION OF THE RETINAL ARTERIES.

BY

ARTHUR J. BALLANTYNE, M.D.

SURGEON, EYE INFIRMARY, GLASGOW.

(*Continued.*)

Mechanism of the Pressure Pulse.

Most authors have implied, and some have definitely stated, that the three forms of the retinal arterial pulse are three distinct phenomena, the pressure pulse especially being put in a class by itself, as having a different origin and different significance from the others. It has been customary to give to the intra-ocular pressure a share in the production of the pressure pulse, but to leave it out of account in discussing the mechanism of the other forms. Jacobi¹⁶ and Ulrich¹⁹ recognised that intra-ocular pressure played a rôle in the causation of these also, and Jacobi believed that he had seen transitions between the expansile and collapsing forms of the pulse. This, however, has not been confirmed, or even noticed by most of the subsequent writers. The influence of the intra-ocular pressure in producing the collapsing pulse, has, of course, been universally recognised. Indeed one of the earliest observations of the arterial pulse was that of von Graefe, who saw the pressure pulse in glaucoma, and also showed that it could be artificially induced in normal eyes, by pressure with the finger. The analogy of the hæmodynamometer, made use of to explain the mechanism of the expansile pulse, applies here also. In glaucoma, or under pressure with the finger, intra-ocular pressure becomes so high that it approaches, and ultimately equals the diastolic pressure in the arteries, and the intermittent inflow occurs.

If this phenomenon only occurred in the two conditions mentioned, or if it were never found in combination with the other forms of arterial pulse, one would be justified in keeping it in a class by itself. Certain facts, however, show that the different forms of the pulse are more closely related to one another than is generally supposed.

(1) I have mentioned that Jacobi, by varying degrees of finger pressure in rabbits, was able to produce an expansile pulse passing into the typical collapsing pulse. The latter was confined to the disc, as in glaucoma. Türck²⁰ has more recently made a similar claim. I can support these statements, for I had, even before seeing the papers referred to, repeatedly convinced myself that during the application of digital pressure, there first appeared an expansile pulse, not confined to the disc, and then, after further increase of pressure, the pressure pulse appeared on the disc. Since in most cases in which such pressure experiments are made, the pulse pressure in the retinal arteries is small, and therefore one of the conditions favourable to the

occurrence of the visible expansile pulse is absent, this expansile effect is usually difficult to see, whereas the collapsing pulse when it occurs on raising the pressure, is a good deal more striking, and seems to occur suddenly, without any transition through the expansile form.

(2) Another observation I have made also links together these two forms of pulse. In a case of glaucoma in which there was no pressure pulse, but expansile pulse both on the disc and beyond it, slight pressure on the eye with the finger converted the expansile pulse within the area of the disc into the typical collapsing pulse, while it increased the distinctness of the expansile pulse in the arteries beyond the disc margin.

(3) In cases of aortic regurgitation or other disease, in which a pronounced expansile pulse is visible, it needs only the slightest pressure with the finger to convert this expansile pulse within the area of the disc, into a collapsing pulse.

(4) Not only so, but among the first cases of aortic regurgitation which I examined in this connection, there was one in which the pressure pulse was present without artificial pressure being required to elicit it. Emptying of the segments of the artery coincided with the dropping of a beat in the radial pulse, refilling coinciding with the next succeeding wrist pulsation. All the other forms of the retinal pulse were present in this case, *viz.*, locomotor and expansile pulse of the arteries, end pulse and expansile pulse in the veins, and capillary pulse on the disc. Jacobi (*loc. cit.*) has apparently made one or more observations of a similar kind.

(5) Another occasional occurrence has also a bearing on this point. Wordsworth²⁰ reported having seen spontaneous pulsation in the fundus of an anæmic subject, at the moment of a fainting fit which occurred while ophthalmoscopic examination was being made. This was probably the pressure pulse. I have had an opportunity of observing the same phenomenon. The patient was an extremely anæmic girl. She was examined sitting upright in bed. Locomotor pulsation was observed in some of the retinal arteries, but suddenly the pressure pulse appeared in the disc segments of the arteries, the girl complained of feeling sick, and fainting occurred. Here there was a fall of blood pressure so sudden that it was not at once accompanied by a fall in intra-ocular pressure. The latter was temporarily higher than diastolic pressure in the retinal arteries, and the collapsing pulse occurred.

These five observations are sufficient to show that, while in the majority of cases of the pressure pulse high intra-ocular pressure is the preponderating factor, and in the typical expansile pulse the form of the pulse wave is of greatest importance, still the two forms of the pulse are not entirely separate phenomena, but have this in common, that the intra-ocular pressure plays a part in their production, and that in both of them the intra-ocular pressure is equal, or nearly equal, to diastolic blood pressure in the retinal arteries.

Mechanism of the Capillary Pulse.

After what has been said regarding the locomotor, expansile, and pressure pulses, the capillary pulse will not present any difficulty. From the description of it already given, it will be seen that it closely resembles the well-known capillary pulse seen in skin or mucous membrane or under the finger nail, in cases of aortic regurgitation. The only difference, indeed, is that while in the skin and mucous membranes it is usually necessary to apply a little additional extravascular pressure in order to bring out the pulsation, the capillary pulse on the disc is usually, in such cases, a spontaneous phenomenon.

In cases of aortic regurgitation without visible capillary pulse on the disc, the latter can often be produced by pressure on the eye with the finger. This is a further demonstration of the part which intra-ocular pressure plays in the production of the retinal pulse.

I have already shown that the mechanism favourable to the transmission of the arterial pulse through the capillaries to the veins, is present in the human eye, since the normal intra-ocular pressure maintains a somewhat high venous resistance by narrowing the veins at their exit on the disc. It is probable that under physiological conditions the circulation in the capillaries of the retina and disc is pulsatory as regards pressure and velocity, but without causing expansion and contraction of calibre. But if the pulse wave is modified as we have it in aortic regurgitation, the conditions are at once established for the conversion of this into an actual expansion and contraction of the capillaries, showing itself as the visible capillary pulse.

We see then that the capillary pulse and the three forms of arterial pulse are related to each other through their dependence on a common mechanism which comprises two factors, *viz.*, the intra-ocular pressure, and the blood pressure within the retinal arteries. In the case of the locomotor pulse the influence of the first is at a minimum, while in the best marked examples the second is pathological, in the sense that the range between systolic and diastolic pressure is abnormally great. In the case of the expansile pulse intra-ocular pressure may be abnormal, as in glaucoma and the finger pressure experiments, but to a far greater extent this pulse also depends on the oscillation of the blood pressure, *e.g.*, as in aortic regurgitation. In the case of the collapsing pulse intra-ocular pressure may be pathological, with blood pressure normal (glaucoma and pressure experiments) or with normal intra-ocular pressure endovascular pressure may be abnormal (syncope and cardiac disease with dropped beats) or both factors may be pathological (experimental pressure in aortic cases). The most typical of these possibilities is, of course, glaucoma. The conditions associated with the capillary pulse resemble most closely those of the expansile pulse but the capillary pulse may sometimes be produced experimentally by application of pressure in cases of aortic regurgitation or even in normal eyes.

Significance of the Arterial Pulse.

We have now to consider in what classes of cases the phenomena we have been discussing are found, with a view to arriving at a conclusion as to the diagnostic and prognostic significance, if any, which they possess.

The locomotor pulse was first observed in association with insufficiency of the aortic valves. It was described in that connection by Quincke and by Becker, forty years ago. The latter¹⁰ also described it as occurring in a case of detachment of the retina. Raehlmann¹⁸ saw the locomotor pulse in neurasthenia, and in the anæmia following profuse bleeding. Schmall²¹ described the arterial pulse, chiefly the locomotor form, as occurring in mitral disease, synechia totalis pericardiæ, cardiac dilation, croupous pneumonia, acute rheumatism, pleurisy, and phthisis. Thoma²³ put forward arteriosclerosis as a contributing cause of the pulse, both locomotor and expansile.

The expansile pulse has, like the locomotor, been chiefly described in connection with aortic regurgitation. Pulsation of some kind, probably locomotor or expansile or both, has been described in aortic aneurysm, Graves' disease, pernicious anæmia, chlorosis, and the algid state of cholera. The capillary pulse has hitherto only been described in aortic insufficiency.

The pressure pulse was originally seen by von Graefe in glaucoma, and

produced by him artificially in normal eyes. It may have been this form that he mentioned later as occurring in a case of exophthalmos and neuro-retinitis due to retrobulbar tumour. Pflüger¹⁶ reported having seen an arterial pulse on the disc, like that in glaucoma, in post-neuritic atrophy of the optic nerve from meningitis. It was probably this form also which was seen by Wordsworth during a temporary faint. Jacobi¹⁵ observed the pressure pulse in a case of aortic insufficiency.

My own observations deal with several hundred cases, those of which I have kept notes being: (i) 319 patients in the medical wards of a general hospital, and (ii) 100 outdoor patients at the Eye Infirmary, whose ages ranged from seven to sixty-five years. The cases in group (ii) were all unselected refraction cases and were taken as a means of estimating the frequency of the pulses in presumably healthy subjects. Among them the locomotor pulse alone was found in 33 per cent., the expansile pulse, along with the locomotor, in 3 per cent., the pressure pulse and capillary pulse not at all. There was therefore an arterial pulse of some kind in 36 per cent.

Analysis of the medical cases in group (i) gives the following results:—

- | | | | | |
|--|-----|-----|------|-----------|
| (a) The locomotor pulse alone was present in | 75 | = | 23.5 | per cent. |
| (b) The expansile pulse | ... | ... | 32 | = 10.03 " |
| (c) The capillary pulse | ... | ... | 13 | = 4.07 " |
| (d) The pressure pulse | ... | ... | 1 | = 0.03 " |

In twelve of the group (c) one or both of the other pulses were present, and the same applies to the case in which the pressure pulse was present. There is therefore some overlapping in the above classification, but some kind of arterial pulse was present in 108 cases, or 33.8 per cent.

Since the arterial pulse is to be found in 36 per cent. of healthy persons, it may almost be looked upon as a physiological occurrence, in the same sense, that is, as we apply the term physiological to the venous pulse, which occurs in about 70 per cent. of the same individuals. It is likely that 36 per cent. is an under, rather than an over, estimate of the frequency of the pulse, since it is almost certainly overlooked in some cases owing to unsteadiness on the part of the patient or of the observer.

The fact that the medical cases show an arterial pulse somewhat less frequently than the healthy subjects, would suggest that conditions of ill-health reduce the frequency of the phenomena. The explanation of the discrepancy will probably appear if we consider the character and distinctness of the pulsations in the different groups. For example, the locomotor pulse was found alone in 33 per cent. of the refraction cases, but in only 23 per cent. of the medical cases. Among the latter, however, in almost half it was sufficiently well-marked to be easily seen in most of the arteries and in both eyes, while among the refraction cases the majority had only a slighter form of the pulse, which had to be carefully looked for and in some cases appeared in one eye only or in one or two vessels. This means that a slight locomotor pulse such as is found in over 30 per cent. of normal eyes, is relatively rare (about 12.5 per cent.) in cases met with in the medical wards, which shows that either certain conditions of ill-health, or the conditions of life in hospital (rest in bed, freedom from exertion and excitement) reduce the frequency of the "physiological" arterial pulse. No doubt both of these suppositions are true.

A *pronounced* locomotor pulse was present about four times as frequently among the medical as among the normal cases, which leads us to conclude that a well-marked form of the locomotor pulse is pathological.

A still more striking difference between the cases of groups (i) and (ii) is brought out when we consider the expansile pulse. This was found in more than 10 per cent. of the medical cases, but only in 3 per cent. of the refraction

cases; moreover, in a large number of the former, the expansile pulse was a striking phenomenon, while among the latter it was never so. The capillary pulse, again, was found in 4 per cent. of the medical cases, but not at all in the other group.

From these figures, and from one's general experience of the phenomena, which cannot be expressed in figures, one may conclude that a slight displacement pulse is to be seen, if carefully looked for, in more than a third of healthy individuals, that some diseases have the effect of suppressing the pulse or rendering it less distinct, while others render it abnormally distinct, and in many cases even produce in addition the expansile pulse and the capillary pulse.

(*To be Concluded.*)

INTERSTITIAL KERATITIS (CONGENITAL SYPHILITIC) TREATED BY SALVARSAN.

BY

G. F. C. WALLIS, M.D. EDIN.,

LATE SENIOR HOUSE-SURGEON ROYAL LONDON OPHTHALMIC HOSPITAL, CITY ROAD,
LONDON, E.C.

Introductory.

IN all large ophthalmic clinics there is a considerable number of patients with interstitial keratitis, and their treatment is the most unsatisfactory and tedious of any that fall to the lot of the ophthalmic surgeon. The advent of di-oxy-diamido-arseno-benzol, "606," and its later derivative "914," was made the occasion of trying its efficacy in this affection, with varying results. At the British Medical Association Meeting in 1912 there were those who believed it to be of some use (S. Stephenson and T. H. Butler), and others who denied its value in this disease.

Below are recorded the consecutive cases of interstitial keratitis admitted to the Royal London Ophthalmic Hospital, and treated with the new arsenic preparations. Although recovery has not been perfect in every case, the results in shortening the time are sufficiently striking to make the prospect much more hopeful. A positive Wassermann reaction was found by the bacteriologist, Dr. S. H. Browning, in nine cases examined, and in the tenth a positive Nagouchi "Luetin" test.

In recording these cases I have not thought it necessary to refer to the usual congenital syphilitic stigmata.

The treatment of these cases has been as follows:—*Local*.—Atropine and hot bathings in the early stages, and in the late, yellow oxide of mercury with atropine. *General*.—Mercury administered both by the mouth and by inunction, together with iodide of potassium, grs. x to xxx three times a day. This systemic treatment was carried out only in the intervals between the injections.

The injections were made intravenously with the Browning apparatus, and after his method, the patient being prepared overnight as for a general anæsthetic, and the injection given in the morning, with the patient in the recumbent position. The left median basilic was chosen for preference, as the left arm can be kept at rest more easily than the right, and thus the risk of thrombosis is lessened. Following upon the injection it is essential that the patient should remain in bed for twenty-four hours, after which, if there be no rise in temperature or other symptom, he is allowed up. As a

rule, the needle damages the vein so little that thrombosis is a rarity, (no case, as yet, having occurred at Moorfields); and upon several occasions it has been found necessary to utilize the same vein. Adults, of both sexes, have received a full dose of "606" or "914" at each injection, and children (in the interstitial cases the age of the youngest has been 13 years), a proportionate dose. The injections have been given as far as possible every ten days to a fortnight, until the requisite number has been administered. The interval of ten days has been chosen because the spirochæta pallida may become immune if too long an interval is allowed to pass.

Cases.

1.—**Robert R.**, age 20. Right first affected May, 1912, and left October, 1912. Ordinary treatment for interstitial keratitis elsewhere during six months.

On admission October, 1912. Right cornea flat, dense, vascularised opacity almost throughout, with adherent iris, T-1. R.V.=H.M. Left, diffuse corneal opacity and salmon patching, T.n. L.V.=counts fingers at 1 foot. Intense photophobia and lacrymation in both eyes.

October 16th.—*Intravenous* "914," 9 Grm. Followed by increased photophobia for two days. On November 4th condition in either eye but little changed.

November 5th.—*Intravenous* "914," 9 Grm. November 6th, local condition more marked. November 21st, right cornea commencing to clear at the periphery. Left cornea much clearer and less vascularised, pupil commencing to dilate. T.n. L.V.=2/60. Much less irritation in both.

November 22nd.—*Intravenous* "914," 9 Grm. November 23rd-25th increased injection and left cornea more hazy.

December 3rd.—*Intravenous* "914," 9 Grm. Followed the next day by slight increase in local symptoms. December 5th, right cornea clearer and details of iris can be seen. T.n. R.V.=H.M. Left, very little vascularisation, pupil wide, T.n. good reflex, L.V.=6/60. December 11th, L.V.=6/36 (1), both eyes free from injection and photophobia.

December 12th.—*Intravenous* "914," 9 Grm. No increase in local symptoms. January 1st. L.V.=6/24. R.V.=H.M. This patient was not seen again.

2.—**William W.**, age 23. Right affected six weeks, left shortly after. Was under treatment in the out-patient department for a fortnight. Condition on November 3rd, 1912: right cornea almost completely vascularised and opaque. T.n. R.V.=H.M. Left cornea less severely affected. T.n. L.V.=counts fingers at 2 feet.

November 4th, 1912.—*Intravenous* "914," 9 Grm. November 4th to 8th increased vascularity of corneæ, and irritation. November 11th corneæ clearer.

November 15th.—*Intravenous* "606," 6 Grm. November 16th to 21st much photophobia and irritation.

November 26th.—*Intravenous* "606," 6 Grm. November 27th to December 2nd, injected and irritable. December 12th corneæ clearer, details of irides begin to appear. R.V.=counts fingers at 2 feet. L.V.=H.M.

December 13th.—*Intravenous* "914," 9 Grm. The increased local reaction was but slight.

December 31st.—*Intravenous* "606," 6 Grm. January 1st, 1913, no local reaction. January 13th, corneæ clear at periphery, still some central opacity; no ciliary injection nor photophobia. R.V.=1/60. L.V.=1/60. Good reflex but no details of fundus can be seen. February 11th, R.V.=5/60, L.V.=1/60. Good reflex, but no details of fundus.

Intravenous "914," 4 Grm. (Half dose owing to difficulties in technique). March 18th.—Right free from injection; small dense central corneal opacity R.V.=6/24. Left, slight ciliary injection, marked corneal opacity slowly clearing at the periphery. L.V.=1/60.

3.—**Horace E.**, aged 23. Was treated in the ordinary way as an in-patient from July to September, 1912. Treatment with "606" started four months after the left was affected, and one month after the right. Condition on September 6th: Right diffuse interstitial corneal opacity with salmon patches. Iris not seen. No reflex. R.V.=counts fingers 1 foot. Left, dense central opacity, less so at periphery. Very large vessels and salmon patching. No view of iris. L.V.=P.L. Much photophobia in R and L. *Intravenous* "606," 6 Grm. followed by increased local symptoms until September 9th. October 3rd the increased photophobia has passed off and the right cornea appears clearer, pupil can now be seen. October 18th, both corneæ are clearing well. *Intravenous* "606," 6 Grm. October 20th, there is still some photophobia, but the corneæ are clearer. October 29th, R.V.=6/36 (1). T.N. L.V.=H.M. T-.

November 3rd.—*Intravenous* "914," 9 Grm. No local reaction followed. November 9th.—R.V.=6/24, with + 2 D.S.=6/18. L.V.=H.M. November 25th.—Right, still much opacity of the cornea: good reflex, no details. R.V.=6/9 with + 2 D.S. Left, dense central opacity, iris details seen at periphery. L.V.=counts fingers at a foot.

4.—**George H.**, age 33. Right and left corneæ affected ten weeks; no treatment. Condition November 1st, 1912. Right and left much interstitial opacity and salmon patching, moderate ciliary injection, pupils barely seen. R.V.=counts fingers at 1 foot. L.V.=H.M. T.n.

November 1st.—*Intravenous* "914," 9 Grm., followed by slight local reaction.

November 15th.—*Intravenous* "606," .6 Grm. No local reaction.

November 28th.—*Intravenous* "606," .6 Grm. Dec. 13th, corneæ clearer. *Intravenous* "606," .6 Grm. January 11th, 1913.—(Treatment has been delayed by a bad tonsillitis). Right and left: There is still diffuse haze but little vascularization, dull reflex, pupils wide. R.V.=4/60, L.V.=H.Ms. February 12th, 1913.—The pupils are active and the corneæ much clearer, but the vision not improved. R.V.=4/60, L.V.=counts fingers at 1 metre. There is a good fundus reflex but no details. *Intravenous* "914," .9 Grm. March 18. Still slight opacity of R. and L. cornea. R.V.=6/60, L.V.=2/60. The very defective vision cannot be accounted for entirely by the corneal condition, but no choroiditis can be seen.

5.—**Alfred G.**, age 13. Left became affected after a slight injury six weeks ago, right shortly after. Condition Nov. 11th, 1912. Right and left: much injection and photophobia; opacity marked, especially in the right cornea, pupils wide. Much keratitis punctata in left.

November 13th.—*Intravenous* "606," .25 Grm. November 15th more injection and opacity in both. November 29th.—*Intravenous* "914," .45 Grm. December 4th opens both eyes well.

December 13th.—*Intravenous* "914," .45 Grm. No local reaction December 27th, corneæ much clearer. R.V.=6/36, L.V.=4/60.

December 28th.—*Intravenous* "914," .45 Grm., followed by no reaction. Jan. 8th, 13, R.V.=6/24, L.V.=4/60. Jan. 18th, R.V.=6/18, L.V.=6/60. Still considerable opacity in both. Pupils wide. Feb. 10th, R.V.=6/12, L.V.=6/24 pt. Details of fundus not clearly seen.

6.—**George S.**, age 22. Right and left inflamed five weeks; no treatment, "has never seen out of left," Condition November 6th, 1912: Diffuse haze and vascularity of both corneæ; intense photophobia and lachrymation.

November 6th.—*Intravenous* "606," .6 Grm. November 7th, no view of corneæ because of the intense photophobia. Nov. 14th, photophobia very marked, but corneæ clearer.

November 15th.—*Intravenous* "914," .5 Grm. (Half dose because of difficulty of injection.)

November 27th.—*Intravenous* "606," .5 Grm. November 28th to 29th, slight local reaction. December 5th, corneæ clearer, much less vascularity, pupils wide, photophobia slight. R.V.=5/60, L.V.=1/60.

December 10th.—*Intravenous* "606," .6 Grm. Dec. 11th, slight local reaction lasting one day. R.V.=6/36, L.V.=4/60. January 9th, 1913, R.V.=6/18. *Intravenous* "606," .6 Grm. No local reaction. January 13th, corneæ almost cleared, no photophobia. R.V.=6/12, L.V.=4/60. Feb. 10th, R.V.=6/12, L.V.=6/60. Fundus details indistinct. There is some keratitis punctata in the right.

7.—**Gerald H.**, age 16. Left inflamed five weeks; ordinary treatment during this time. Condition December 29th, 1912, interstitial opacity, chiefly central, but salmon patches above and below; moderate lachrymation and photophobia. L.V.=2/60. Right healthy, R.V.=6/12.

January 1st, 1913.—*Intravenous* "606," .35 Grm. January 2nd, pupils smaller, otherwise no local reaction. January 11th, corneal opacity as before. *Intravenous* "914," .5 Grm. January 12th, no local reaction. January 15th, cornea clearing. January 20th, still some salmon patching, L.V.=6/36. *Intravenous* "914," .45 Grm. January 21st, no local reaction. January 25th, still slight lachrymation and photophobia; cornea clearer, still some vascularity above, pupil wide, good reflex, details of fundus not clear. L.V.=6/12. Right healthy. R.V.=6/12. March 18th, the right eye remains healthy. R.V. and L.V. as before.

8.—**Edgar A.**, 29. Right inflamed one month. Condition on October 22nd, 1912: Right much injected, diffuse corneal opacity with salmon patching above and below, pupil 1/3 dilated, considerable photophobia. R.V.=counts fingers at 1 foot. Left healthy. L.V.=6/6. *Intravenous* "914," .9 Grm. November 5th, salmon patching more marked. *Intravenous* "914," .9 Grm. November 6th, considerable local reaction. November 10th, salmon patch very marked, iris only seen at periphery. R.V. H.M.

November 26th.—*Intravenous* .9 Grm. November 27th, very slight local reaction. December 13th, right free from injection, cornea clearer, no salmon patching. R.V.=2/60. *Intravenous* "606," .6 Grm. No local reaction. December 16th, R.V.=5/6. L.V.=6/6. February 10th, 1913, Right cornea opacities slight, pupil wide, good reflex, but no details of fundus. R.V.=6/12. *The left has been inflamed two months.* Left diffuse corneal opacity. Large salmon patch above. L.V.=2/60.

Intravenous "606," .6 Grm. No local reaction. February 22nd, *Intravenous* "914," .9 Grm. No local reaction. March 1st, left much less ciliary injection. March 18th, left practically free from injection and photophobia; opacity of the cornea marked but clearing well at the periphery. L.V.=1/60. Right eye as before. Is continuing the treatment for the left eye.

9.—**Albert S.**, age 19. Left eye was affected nearly five months, and the right two weeks, before the administration of "606"; had had the usual treatment throughout this period. Condition on October 1st: right moderate injection, cornea shows commencing interstitial opacity on the inner side. Iris bright, pupil wide. R.V.=6/9. Left, shrinking, dense corneal opacity, L.V.=H.M. T.—1.

October 1st, 1912.—*Intravenous* "914," .9 Grm. October 7th, interstitial keratitis much more marked. November 4th, right much lachrymation and photophobia, salmon patchings above and below dense central opacity. No view of pupil. Left, clearer at periphery, where iris can be seen but central opacity very vascular and dense.

November 6th.—*Intravenous* "606," .6 Grm. November 7, complains of pain. Local symptoms much more marked.

November 17th.—*Intravenous* "606," .6 Grm. November 29th, right and left much photophobia and injection, but corneæ clearing. R.V.=H.M. L.V.=H.M.

November 30th.—*Intravenous* "606," .6 Grm. November 31st, no local reaction. December 7th, still moderate injection but little photophobia. The opacity in the right is breaking up, and the left is clearing at the periphery. R.V.=H.M., L.V.=counts fingers at 1 foot. Discharged. Re-admission

No.	Name.	Age.	Number of Injections.	Duration of affection in weeks before commencement of "606" treatment.	Vision before treatment.	THE VISION after the commencement of Salvarsan treatment.							
						3 Weeks.	4 Weeks.	6 Weeks.	8 Weeks.	10 Weeks.	12 Weeks.	14 Weeks.	16-18 Weeks.
1.	Robert, R. ...	20	5	R = 24 L = 4.	R = P.L., F., L. = 1-ft.			R = $\frac{5}{60}$	R = $\frac{5}{24}$ L. = H.M.	Was not seen again.	R = $\frac{5}{60}$ L. = $\frac{1}{60}$		R = $\frac{5}{24}$ L. = $\frac{1}{60}$
2.	William, W.	23	6	R. and L. = 6	R = H.M., F., L. = 1-ft.				R = $\frac{1}{60}$		R = $\frac{5}{60}$ L. = $\frac{1}{60}$		R = $\frac{5}{24}$ L. = $\frac{1}{60}$
3.	Horace, E. ...	23	4	R = 4 L. = 16	R = $\frac{1}{12}$ ft., L. = P.L.					R = $\frac{5}{66}$	R = $\frac{5}{14}$	R = $\frac{5}{6}$ L. = H.M.	
4.	George, H. ...	33	5	R. and L. = 10	R = $\frac{1}{12}$ ft., L. = H.M.					R = $\frac{1}{60}$ L. = H.M.		R = $\frac{1}{60}$ L. = 1-ft.	R = $\frac{1}{60}$ L. = $\frac{1}{60}$
5.	Alfred, G. ...	13	4	R. and L. = 6	*			R = $\frac{1}{60}$ L. = $\frac{1}{60}$	R = $\frac{1}{18}$ L. = $\frac{1}{60}$		R = $\frac{1}{12}$ L. = $\frac{1}{24}$		
6.	George, S. ...	22	5	R. and L. = 5	*			R = $\frac{1}{60}$ L. = $\frac{1}{60}$	R = $\frac{1}{18}$ L. = $\frac{1}{60}$		R = $\frac{1}{12}$ L. = $\frac{1}{60}$	"Left always defective."	
7.	Gerald, H. ...	16	3	R. Healthy L. = 5	R = $\frac{1}{6}$ L. = $\frac{1}{60}$			L. = $\frac{1}{12}$					
8.	Edgar, A. ...	30	4 for R. 2 for L. To continue	R. 4 L. affected subsequently	R = $\frac{1}{12}$ ft., L. = $\frac{1}{6}$			R = $\frac{1}{60}$				R = $\frac{5}{60}$ L. became affected.	R = $\frac{1}{12}$
9.	Albert, S. ...	19	5	R = 2 L. = 20	R = $\frac{1}{6}$ L. = H.M.							R = $\frac{1}{12}$ F. 1 metre	No further improvement.
10.	Sidney, W. ...	16	2 To continue	R and L. = 32	R = $\frac{1}{12}$ ft., L. = H.M.							L. = $\frac{1}{2}$ metres	

* Photophobia too marked.

F. = Counts fingers at a foot
1-ft.

January 30th, 1913. Some photophobia. There is still much opacity in the right with new vessels. Left slowly clearing at periphery. R.V.=counts fingers at 1 metre, in the left at 2 metres.

January 31st.—*Intravenous* "606," 4 Grm. February 1st, no local reaction. March 25th, right and left vision and corneal condition as before.

10.—**Sidney W.**, age 16. Right and left inflamed eight months. Has been under treatment at an ophthalmic hospital as an in-patient for three months. Condition February 3rd, 1913: right and left moderate ciliary injection, much photophobia and lacrymation. Interstitial opacity of both corneæ, which are almost completely covered with new vessels, especially the left. The anterior chambers are deep. Irides can be dimly seen; pupils half dilated. R.V.=Counts fingers at one foot. L.V.=H.M. Feb. 4th. *Intravenous* "914," 45 Grm. Feb. 5th, no local reaction. Feb. 9th, moderate photophobia and injection, corneæ clearing, pupils small. Feb. 19th, *intravenous* "914" 45 Grm. No local reaction. March 1st, both corneæ clearer, but still some ciliary injection and photophobia; vision as before. Is continuing the treatment.

Comments.

Following upon the injection, in some cases the same evening, but generally the morning after, there is a *local reaction*, marked by increased photophobia and lacrymation, and possibly some pain. Associated with this is increased injection, both of the ciliary and of the newly-formed corneal vessels; the cornea may be more hazy. The pupil becomes contracted and is often difficult to dilate. This local reaction usually persists for two to three days. It is most marked after the first two doses, and in some the third, but gradually lessens. The fourth and fifth doses are, as a rule, free from this exacerbation of the symptoms. In one case, No. 7, the youngest of the series, no local reaction followed upon any of the injections. This local reaction is of considerable interest, as I have not found it to occur in other ocular lesions, associated with ciliary injection and iritis, such as sympathetic ophthalmia, several cases of which have been treated with "606" and "914."

Subsidence of Local Symptoms and Clearing of the Cornea.—A perusal of these cases will show (with the exception of No. 7) how disappointing are the results obtained after the injection of one or two doses. Excluding No. 7, the condition has not been much improved until after the third; in fact, the first two doses, taking into account the local reaction with the associated discomfort of the patient, actually appear to make the disease worse. After the administration of the third or fourth dose the corneæ begin to clear, the pupils to dilate, and the ciliary injection and photophobia to subside. In some the clearance was so marked, once the process started, that a difference could be noted daily (Nos. 5, 6, and 7). In one, No. 4, the corneæ have cleared remarkably well, but the vision has not been restored. Improvement started after the first injection in the case of No. 7. In one case only, No. 9, has the disease still been fairly active at the end of the fifth injection. In those that have responded well to treatment (seven out of the ten cases), the vision has been restored, varying between 6/24 up to 6/9 in from two to three months. One patient, No. 6, developed, some six weeks after apparent recovery, a good deal of keratitis punctata; this has since subsided, but it is evident that the activity of the disease had not quite died out.

The occurrence of Choroiditis is difficultly to estimate, partly on account of the usual anterior position, and partly because the corneæ have not cleared enough for a thorough ophthalmoscopic examination.

The treatment is disappointing, inasmuch as No. 8, which was thoroughly treated, developed interstitial keratitis in the sound eye, when the affected eye had almost recovered; this case is now undergoing further treatment with Salvarsan. Thus, it is obvious that "606" and "914" do not prevent the involvement of the unaffected eye in monocular cases. I think there is

little doubt that "914" is quite as efficacious as, and causes no more local reaction than, "606," although no case has been treated with one or other throughout.

It would appear that the earlier treatment is started, the quicker and better is the result attained. The two older patients, aged 33 and 29 years, responded as well to treatment as the younger adults. I have not had the opportunity of treating any young children; but did such present, I should not hesitate to administer Salvarsan from the age of nine, exercising due precaution as to dosage. Dr. S. H. Browning has administered "606" and "914" to children as young as seven at Moorfields for sympathetic ophthalmia, and in one case *per rectum*, without ill effects.

General Effects.—In the male patients there have been no symptoms. With female patients treated for other than interstitial keratitis, and boys, there has usually been headache associated with sickness and some rise in temperature. These symptoms have invariably subsided in twenty-four hours. The repeated dosage has caused no ill effects, and often the general condition has very greatly improved.

The fact that all of these cases have been treated with mercury and iodides in addition does not mitigate against the value of the treatment, as mercury and iodides alone will not cause such rapid improvement. No doubt the recovery of the patients in this series, has been greatly aided by several weeks' residence in hospital, with its attendant hygienic conditions. Largely to this must be placed the credit of the improvement in the general health of all. It must also be borne in mind, in favour of the treatment, that several of the cases were adults, who, as a rule, suffer more severely than children. Further, two of the cases had been under the ordinary treatment for several months without success before the administration of Salvarsan.

Conclusions.

That "606" and "914" are of great benefit in a considerable number of cases, very appreciably lessening the time of recovery. These drugs may not prevent the affection involving the sound eye in monocular cases.

I wish to thank Messrs. J. B. Lawford, A. Lawson, J. H. Parsons, C. Worth, and M. L. Hepburn for permission to publish these cases, and Dr. S. H. Browning for his help.

CLINICAL MEMORANDA.

GUAIACOL DIAPHORESIS IN OPHTHALMOLOGY.

C. G. RUSS WOOD,
F.R.C.S.,

SURGEON TO THE EYE, EAR, AND
THROAT HOSPITAL, SHREWSBURY.

BY
AND

FREDERICK A. ANDERSON,
M.D., D.P.H.,

ASSISTANT SURGEON TO THE EYE, EAR, AND
THROAT HOSPITAL, SHREWSBURY.

IN the practice of ophthalmology the value of diaphoresis has long been recognised in the treatment of certain lesions. As early as 1854,¹ and probably much earlier, it was employed in cases of iritis, and later it came to be regarded as an adjuvant of primary importance in dealing with deep-seated ocular inflammations of all kinds. It is a matter for regret, however, that, in common with many other old and well-tried therapeutic measures, diaphoresis has, to a great extent, fallen into desuetude. It has

been said that "the modern spirit can forgive everything except age," and to nothing can this be applied more pertinently than to medical and surgical procedures.

Dealing, as we are, with such an old-fashioned method, we may perhaps be allowed briefly to review the underlying principles of diaphoretic treatment as applied to localised inflammatory conditions. The primary effect of free action of the sweat glands, namely, excretion, is relatively unimportant, for it is doubtful if any toxic substances are got rid of by the skin. As a necessary result, however, of the excretion of water, the blood is deprived of some of its aqueous content, and is rendered thicker in consistence. Such a condition is inconsistent with physiological equilibrium, and hence results in an abstraction of fluid from the body tissues. In the presence of many pathological conditions, such a sequence of events is manifestly of value as a means of procuring the absorption of toxins and exudates by the blood, whence they may be excreted by natural channels. This hastening of absorption may further be applied to secure a rapid and intense action of certain drugs, notably mercury, a method adopted in many of the Continental Spas.

As a means of promoting diaphoresis the time-honoured methods of using dry and vapour heat baths, while excellent in their effects, have certain obvious disadvantages. Their use is practically limited to institutional treatment, and even then is cumbrous and troublesome in the extreme. The injection of pilocarpine, as advocated by Darier² and Burnham,³ is sometimes of great value, but those of us who have experienced the extreme depression which frequently follows the exhibition of this drug, are somewhat fearful of employing it. Even when combined with strychnine, pilocarpin may produce this undesirable complication.

From the foregoing objections the method of procuring diaphoresis by means of the external application of guaiacol is wholly free; and, in addition, it appears to us to have certain advantages of its own. It is now some years since one of us (R.W.) drew attention to the value of this method and advocated its use in the treatment of certain ocular lesions.⁴ This action of the drug, although known for many years, has not, so far as we are aware, been applied to ophthalmology.

In reverting to the subject of guaiacol diaphoresis, we are actuated by several considerations, which are chiefly as follows.—First, the observation of an extended number of cases has convinced us that it is the ideal diaphoretic in ophthalmology. Secondly, because guaiacol has had to live down an unenviable reputation gained by its use in improper cases. The dangers alleged to accompany its external application are cited in modern text-books of pharmacology, and much emphasis is laid on the poisonous nature of the drug. This impression is distinctly unfortunate, and would appear to have arisen from the use of guaiacol as an antipyretic in acute febrile conditions. Thus, it was formerly employed in the Meath Hospital, Dublin, for the purpose of reducing high temperature in enteric fever and acute rheumatism, but, according to Dr. Green, of Lincoln,⁵ was finally discarded because its action could not be limited, and also because it was liable to cause collapse. Its use is therefore apparently contra-indicated in the presence of fever. On the other hand, the method has been employed by us to promote diaphoresis in febrile cases, numbering over four hundred, without the occurrence of any untoward symptom. Patients of both sexes, at all ages from ten to seventy years, have been subjected to the treatment, nor has there been any special selection on account of physical fitness, yet never has any marked depression or any sign of collapse been noted. One complication (if such it may be called) is observed in about 10 per cent. of the

cases, namely, an evening rise of temperature of not more than 2°F. This phenomenon is a little difficult to account for, but may be due merely to a disturbance of the heat regulating centre, for it does not occur after the first few applications.

The diaphoresis resulting from the application of guaiacol is very profuse, but it is quite easily controlled. It usually begins within two hours after the inunction and persists for about five hours. With regard to the effect of the drug itself on the body tissues, very little is known; but the following points are established.—When applied to the unbroken skin, it is absorbed freely, and its excretion is mainly effected by the kidneys, almost 50 per cent. of the amount applied to the skin being recoverable from the urine in combination with glycuronic and sulphuric acids. The drug has earned a reputation in diseases of a tuberculous nature, but when administered by the mouth, is liable to upset digestion. The method of application here described is free from this disadvantage, and, moreover, results in a much more intense saturation of the tissues with guaiacol. It should, therefore, be of use in tuberculous affections of the eye. In view of the toxic nature of the drug, upon which stress is laid by pharmacologists, it is an interesting fact that many of our patients gain several pounds after twelve days profuse sweating, although, as a rule, the body weight varies considerably. Moreover, the treatment results in an increase in fitness and *bien être*, very marked in some cases.

The method of application of guaiacol we may give at some length, and in doing so, would like to emphasize the necessity of carrying out the procedure recommended with strict attention to *technique*. Failures to produce diaphoresis have been reported, and such cases were, on investigation, found to be caused by neglect of some detail. It must be remembered that only pure guaiacol should be used, not carbonate of guaiacol, and that it should be obtained from a trustworthy source, as samples apparently vary in their efficiency.⁶

The routine employed by us is the following :—

1. The patient is prepared overnight by the administration of a suitable aperient, and the temperature is recorded on a four-hourly chart. A daily evacuation of the bowels should be maintained.

2. In the morning a very hot bath is given, and the patient is put to bed between blankets with hot-water bottles.

3. The guaiacol pigment, which consists of equal parts of guaiacol and olive oil, is now applied, two drachms of this mixture constituting the average dose. This amount is poured on a piece of lint measuring about six inches square, and is then smeared, not rubbed, over an area in the epigastrium of about the same size as the lint. The piece of lint is now applied over the area so treated, and the whole covered with oiled silk, which is fixed in its place by strapping, and left in position for about four hours. A glass of hot lemonade or peppermint water may be given at the commencement.

4. When the diaphoresis has subsided, the patient is rubbed down and settled comfortably for the night. Should it be found difficult to initiate sweating, as much as three drachms of the pigment may be used, but in any case it is advisable to obtain the maximum effect at first. Experience shows that once a profound effect has been obtained, the sweat glands are more easily stimulated, and as no acquired tolerance to guaiacol occurs, the dose may then be decreased. The position chosen for the application should be varied from day to day to obviate any tendency to dermatitis.

It is our usual practice to combine with the above treatment such drugs as mercury and potassium iodide, the former by inunction and the latter, in

combination with nux vomica, by the mouth. Occasionally also the salicylates are employed instead, and the effect of these drugs appears to be enhanced by the accompanying diaphoresis. The treatment is extended over a period of from six to twelve days, as determined by the progress of the case.

Regarding the indications for treatment by guaiacol diaphoresis, it may be said that it is eminently suited to those deep-seated inflammations of obscure origin which invariably prove so stubborn to ordinary methods. It should not displace the use of vaccines where a bacterial origin can be identified. The following are the chief conditions in which we have used this method of treatment: retrobulbar neuritis, papillædema, vitreous opacities, chronic iridocyclitis (especially if of traumatic origin), non-ulcerative keratitis, and the various syphilitic ocular manifestations.

Extended experience has convinced us of the efficiency of this method of treatment in the above diseases, the therapeutic action of mercury especially being much enhanced thereby. Therefore having used this method for some years, we hope guaiacol diaphoresis may be reviewed and given another trial in certain cases, because we are, in the famous words of Bacon, "inclined to the traditions of experience."

REFERENCES.

1. Mackenzie.—"Diseases of the Eye," 1854.
2. Darier and Stephenson.—"Ophthalmic Therapeutics."
3. Burnham.—"The Combined Treatment in Diseases of the Eye," 1906.
4. *British Medical Journal*, Vol. II, 1909.
5. *British Medical Journal*, Vol. II, 1909.
6. Samples of the drug obtained from Messrs. T. Tyrer & Co., Stratford, E., have always proved trustworthy.

A RESEARCH INTO THE RELATION BETWEEN SYSTEMIC BLOOD TENSION AND RAISED INTRA-OCULAR TENSION.

BY

LIEUT. H. C. CRAGGS,

SENIOR-ASSISTANT, GOVERNMENT
OPHTHALMIC HOSPITAL, MADRAS.

ASSISTANT-SURGEON C. G. TAYLOR,

AND SECOND ASSISTANT, GOVERNMENT
OPHTHALMIC HOSPITAL, MADRAS.

THE systemic blood tension of all cases of glaucoma admitted into the Government Ophthalmic Hospital at Madras is recorded as a routine measure; but with a view to establishing whether there is any definite relation between arterial and intra-ocular tension, the blood pressure of 75 cases of glaucoma was carefully taken with a Hill and Bernard sphygmometer, and the readings recorded on this instrument, checked repeatedly by a mercurial manometer. It was possible by means of a metal T-piece, to connect the two instruments and take simultaneous readings on each, of the same subject.

It is sometimes very difficult to determine with the finger exactly when the pressure of the air pad on the brachial artery has obliterated the radial pulse, and so to eliminate all possibility of error due to the personal co-efficient, Dr. Vaquez' sphygmo-signal was used with the sphygmometer; by this means it was quite easy to obtain exactitude to the last mm. of Hg. of pressure. The intra-ocular tension of all these cases was also recorded by means of a Schiötz tonometer. The blood pressure was taken in 50 young adults, in 25 elderly adults, in 75 cases of cataract (in persons whose age averaged 53) and

in 75 cases of glaucoma. In the last three classes the intra-ocular tension was also taken. The results of these investigations are tabulated below :

	Number	Average age	Systemic tension	Intra-ocular tension
Normal (young adults)	50	24	122	—
Normal (elderly adults)	25	48	136	17 mm. Hg.
Cataract cases	75	53	144	15 „ „
Glaucoma cases	75	49	142	54 „ „

From this one would be led to conclude that high arterial tension is not a necessary and apparently not even a leading factor in the ætiology of glaucoma. On page 95 of THE OPHTHALMOSCOPE for February, 1912, it is stated that while one investigator "could not as a rule find any direct connection between abnormal blood pressure and glaucoma, his results seem to be disproved by another who employed venesection and diaphoresis and found that both systemic and intra-ocular tension were lowered."

It was often noticed that tensions ranging from 180 mm. to 208 mm. of Hg. were recorded in subjects whose intra-ocular tension was normal and with no signs of glaucoma whatever, but the majority of these cases were found to have renal disease and in one individual with 188 mm. systemic tension, although his urine seemed normal, he was a confirmed alcoholic and frankly admitted that he drank as much spirit as he could get.

On the other hand, there were a number of cases of glaucoma with phenomenally high intra-ocular tension (70 to 80 mm. Hg.) as recorded by the Schiötz tonometer, who nevertheless had normal blood pressure.

Venesection undoubtedly reduces the systemic blood pressure, and the intra-ocular tension. This, we think, everybody will admit. There would also seem to be evidence that a high arterial tension may in some cases be a powerful causative factor in the production of glaucoma, but the evidence we have brought forward demonstrates that a high arterial tension is very far from being a necessary factor in its causation.

We are indebted to Colonel Elliot, I.M.S., Superintendent of the Government Ophthalmic Hospital, Madras, for permission to publish these notes, and it was at his request that the subject was made one of special research in this institution.

A NOTE ON EXTRACTION OF CATARACT BY RUPTURING THE CAPSULE ANTECEDENT TO THE SECTION THROUGH THE CORNEA.

BY

E. F. DRAKE-BROCKMAN, F.R.C.S.,
LIEUT.-COL. I.M.S. (RETIRED).
LONDON, ENGLAND.

I HAVE been led to make the following remarks on extraction of cataract by rupture of the lens capsule, as the first step in the operation, after perusal of the interesting article which appeared in the April, 1912, number of THE OPHTHALMOSCOPE, entitled "Notes from an Indian Clinic—the Government Ophthalmic Hospital, Madras : Some Impressions," by Mr. Temple Smith, of Queensland.

On page 200, paragraph 3, the author writes as follows :—

"One of the most interesting and useful innovations in connection with

extraction is the Madras method of opening the capsule before making the incision. A Bowman's cataract needle with a slender shank and a sharp blade is entered in the limbus at the point where the knife will be entered for the incision. Using the blade after the manner of a knife, an attempt—usually successful—is made to cut out a central piece of the capsule with one sweep; failing this, a sufficient opening is made in any position desired. If this is done with care, no aqueous is lost. Besides the advantage of being able to incise the capsule more clearly and deliberately, there is the additional gain, namely, that one can determine whether the lens is hard, soft, or Morgagnian, and modify one's incision accordingly. The opening in the capsule can be made much more accurately with a full eye than with an empty one—and more safely."

Further on the writer says:—"Colonel Elliot advocated the routine use of the measure in cataract as long ago as April, 1903, and has been using it ever since. The writer adopted it two years ago, and it was therefore with no feeling of surprise that he saw its important rôle in the operation."

I am gratified to learn that this method of operation has found favour with my successors at the Madras Government Ophthalmic Hospital since I retired from the post of Superintendent of the Institution in 1894, and that it still continues to be practised, more or less, as I initiated it.

The first occasion on which I put this method into operation was on the 18th January, 1879, in the case of a Hindu male, aged 65, who suffered from a Morgagnian cataract of the right eye. The result was good, the patient being able to count the Army Miniature Bullseye test dots at 16 feet with + 12 D, and Jäger I with + 16 D.

After repeated application of the method in similar cases, I finally employed it in cataracts of *all* kinds, and, with rare exceptions, I have, since then, operated for cataract extraction in this manner with satisfactory results.

In August, 1884, I brought this operation to the notice of surgeons in this country in a paper in the *Ophthalmic Review*, entitled: "A Statistical Review of 1,767 Cases of Cataract Extractions," and wrote as follows:—

"*Primary capsule rupture* is the name by which I have designated this method of operation. I have so named it because the initiatory step of the operation is a division of the lens capsule by a stop needle, the pupil having been fully dilated by atropine. This plan I adopted at first in the case of Morgagnian cataracts, in order to gain a more exact knowledge of the size of the nucleus, and accordingly to limit the section through the cornea. The risks attending the removal of cataracts are hereby greatly lessened, and the escape of the cataract is facilitated. I have subsequently applied this method of operative procedure to all kinds of cataract, and I think the results have justified a continuance of the operation. In no other kind of operation can either so large a surface of the lens capsule be exposed for division by the cystotome, or the iris be kept away from the lens and be rendered less liable to an injury in the division of the capsule."

"As soon as the nucleus in a Morgagnian cataract has escaped into the anterior chamber, it can be more readily examined as to its size, and the corneal incision can be more accurately made to permit of the escape of that body. The successful results which were obtained by this process in the case of Morgagnian cataracts induced me, as I have said, to apply the method to all forms of the disease, and I think I am justified in saying that the operation for extraction is, by this means, facilitated and made more simple."

"The advantages of this plan may be summarised as follows:—

1st. It allows of more extensive laceration of the capsule and at the same time that the anterior chamber remains replete with its fluid.

2nd. It permits of a more complete exposure, and a more thorough knowledge is gained of the size and character of the cataract.

3rd. It diminishes the tendency on the part of the iris to contract, even after the corneal section has been completed, and by this means facilitates the escape of the lens.

4th. By it the possibility of more accurately judging the extent to which the cornea must be divided, to permit of the escape of the lens, is obtained.

5th. The less necessity there is for the introduction of a traction instrument to effect the removal of the lens, and the less interference there is with the actual position of the structures of the eye-ball."

* * * * *

"In my further endeavours to render the operation for extraction still more simple, I laid aside the needle for the division of the capsule, and in thirty-four cases effected the capsule division by means of the cataract knife before completing the transfixion of the corneal tissue. Of this number six proved unsuccessful, or in the proportion of 17·64 per cent. In the endeavour to divide the capsule of the lens fully, the iris is more liable to be injured and the lens structure cut into and broken up, so that iritis occurred in greater frequency as the foregoing tables show. As no corresponding advantages were to be gained by this treatment of the lens capsule, I abandoned it in favour of the division by the needle, prior to making the corneal section."

In the number of the *Indian Medical Gazette* (Special Ophthalmic Number) of June, 1901, published in Calcutta, on page 237 will be found a detailed description of the operation under the heading "Drake-Brockman's Operation—Primary Capsule Rupture."

I am not aware whether many or any ophthalmic surgeons, other than those at the Madras Government Ophthalmic Hospital and others who may have seen it performed at that Institution, have adopted this method of operation. I have on several occasions, when the opportunity presented itself, since my return to England, explained the steps of the operation to enquirers, and it would be interesting to know how far it has "caught on."

From what I have written it will be evident that what Dr. Temple Smith in his paper styles "one of the most interesting and useful innovations in connection with extraction," dates back to the year 1879, when I first resorted to the measure.

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—PATHOLOGY.

(Third Notice.)

- (1) Löwenstein, A.—On the formation of "Drusen" at the surface of the cornea. (*Ueber Drusenbildung an der Hornhautoberfläche.*) *Klin. Monatsbl. f. Augenheilk.*, Mai, 1912.
- (2) Del Monte, Alberto.—Angiosarcoma and mixed round and spindle cell melanotic sarcoma of the iris and ciliary body. (*Angiosarcomate sarcoma globo e fuso cellulare melanotico dell'iride e del loopo ciliare.*) *Archivio di Ottalmologia*, Anno XX, No. 1, July, 1912.

- (3) **Vassilopoulos, Vasilios.**—A contribution to the study of concretions of the lacrymal canaliculi. (Contributo allo studio dei concrenienti dei canalicoli lagrimali.) *Archivio di Ottalmologia*, Anno XX, No. 3, September, 1912.
- (4) **Bourdier.**—Experimental contribution to the study of sporotrichosis by endogenous infection. (Contribution expérimentale à l'étude de la sporotrichose par infection endogène.) *Archives d'Ophthalmologie*, octobre, 1912.
- (5) **Bietti, A.**—Glaucomatous excavation of the disc and optic neuritis. (Glaukomatöse Exkavation der Papille und Neuritis optici.) *Klin. Monatsbl. f. Augenheilkunde*, November, 1912.
- (6) **Fleischer.**—On the nature of Schnabel's vacuoles and their significance in the development of glaucomatous excavation. (Ueber das Wesen der Schnabelschen Kavernen und ihre Bedeutung für die Entstehung der glaukomatösen Excavation.) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1912.

(1) **Löwenstein's** patient was a man, 68 years of age, who had been aware of failure of vision for about four weeks. Two years earlier he had suffered from trachoma, and there were still delicate cicatrices in the palpebral conjunctiva. The corneal zone corresponding with the palpebral fissure showed a dimness, which, under magnification, resolved itself into uniformly scattered delicate yellowish-grey specks, apparently situated in the superficial layers of the cornea. Within this zone there were numerous larger spots, of clearer yellow colour, subepithelial in situation, the largest having a diameter of 0.3 mm. Both lenses were partially opaque, and were luxated upwards and inwards. At a later date the lenses were extracted, with loss of vitreous. The visual results were bad, and the corneal condition progressed.

Particles removed from the cornea from time to time were cut in paraffin and submitted to microscopic examination. The deposits were found to consist of highly refractile bodies, varying in size from one-fourth of the diameter of a red blood corpuscle to double the thickness of the epithelium. They were situated for the most part immediately beneath Bowman's membrane.

A number of staining reactions were tried, and seemed to indicate that the bodies were of the nature of hyalin or amyloid. Although there were obvious nutritional disturbances in the eyes, something else would be needed to explain the localisation of the condition within the limits of the palpebral fissure. The author's view is that wind and dust may be excluded, because the epithelium was not altered, but the man had been for years employed as a raftsmen, and the eyes would thus be exposed to direct sunlight and to glare from the surface of the water.

The paper is accompanied by two coloured illustrations of the macro- and microscopic appearances.

A. J. BALLANTYNE.

(2) **Del Monte**, of Naples, records very fully a case of tumour of the iris in a woman of 44 years. The growth presented the appearance, on external examination, of a double projection forward of iris into the anterior chamber, and the symptoms dated back about a year. The eye was excised, and it was found that there was a moderately large growth in the eye involving the iris and the ciliary body.

Del Monte describes at great length the histological characteristics of the various parts of which the tumour is composed, and concludes that the growth was originally angiosarcoma, and that a pure sarcoma of pigmented round and spindle cells was implanted on this.

LESLIE BUCHANAN.

(3) **Vassilopoulos**, of Naples, refers at considerable length to the record of cases of this nature, and then describes the results of histological examination of a concretion which had been fixed in formalin. No cultural experiments, unfortunately, had been undertaken before fixation, and, in consequence, the interest of the case is considerably lessened.

The point, however, which the author wishes to bring out is, that the concretion is probably due, not to actinomyces or streptothrix, but to lepto-*thrix* somewhat similar to that found in the mouth.

LESLIE BUCHANAN.

(4) The possibility of an endogenous infection of the eye by sporothrix has been already established by the publication of three cases, one by Poulard and Jeanselme, and two others under de Lapersonne. Experimentally in rabbits, direct inoculation has been successfully demonstrated by Fava and by Aurand, whilst, three years ago, **Bourdier** himself achieved the same result by inoculation of cultures of sporothrix into the aqueous. The above findings have formed a basis for comparison with those which the author has now obtained by direct inoculation into the blood stream.

His experiment is as follows.—A fifteen-day culture of *Sporothrix Beurmanni* in physiological saline solution was injected into the left carotid of a well-grown bitch. The first reactionary symptoms were noted in eighteen days, and consisted of a nodular eruption around the left nostril, which ulcerated in forty-eight hours, and a retinitis with abundant nasal secretion, in which *Sporothrix* was discovered. Subcutaneous gummata then appeared, with a nodular eruption in the skin on the left side of the face. The first ocular symptoms appeared in twenty-one days from inoculation in the shape of a sluggish iritis with two gummata showing on the anterior surface of the iris above and below. Simultaneously, a diffuse infiltration of the cornea appeared in its lower half, and, spreading through the whole structure, formed a complete interstitial keratitis, but without conjunctival reaction. During this time the rhinitis diminished and finally disappeared, whilst the subcutaneous nodules became evacuated and fistulæ were established. The keratitis regressed, having attained a maximum on the sixth day from its appearance, and the cornea became transparent, except in its lower part. The gummata of the iris, especially the lower one, increased in size. The vascularisation occurred as in interstitial keratitis from congenital syphilis.

Histological examination of paraffin sections of the globe confirmed the clinical observations:

The posterior segment was almost quite free, the process being confined to the cornea, iris, and ciliary body. The cornea was infiltrated in the deeper layers of the stroma, especially in the sclero-corneal region, where the infiltration appeared to be roughly divided into three layers, corresponding more or less to the pericorneal arterial supply. In the iris the cellular infiltration was chiefly diffuse in the stroma, but here and there it was conglomerate, giving the anterior surface of the structure a mammillated appearance. The ciliary body was much infiltrated at its base, the processes being almost free, whilst the ora serrata was practically normal.

The dominant lesion was a cellular infiltration, diapedetic in type, localised in the anterior segment of the globe, and especially marked in the sclero-corneal region. The cellular reaction was chiefly a lymphocytic one, although various mononuclears, and even *plasmazellen*, were present.

In the subcutaneous nodules the reaction found in this disease is mainly a polynuclear one; it is therefore curious that the same agent should produce in the eye a reaction chiefly mononuclear—suggestive evidence that there is no cellular specificity in sporotrichosis. Compared with the results produced

in the eye by direct inoculation into the anterior chamber or the vitreous, the reaction by inoculation into the blood is a more diffuse one, as might indeed be expected.

Bourdier justly claims to have established the production of a sporotrichotic interstitial keratitis, although it has not yet been observed in man.

Three microphotographs accompany the text. BERNARD CRIDLAND.

(5) From the cases quoted by **Bietti**, of Siena, it appears that optic neuritis may occur in a nerve already the seat of a glaucomatous excavation, while, on the other hand, glaucoma with excavation may supervene in a case of papillitis. In Bietti's own case both ophthalmoscopic and microscopical evidence of the co-existence of papillitis and excavation was obtained. The condition is illustrated by a coloured plate and one figure in the text. The patient, 50 years of age, had undergone an iridectomy in the right eye for glaucoma several years before coming under the author's observation. He complained of pronounced loss of vision of a few days' duration. Vision was finger-counting at four metres, and tension + 2. O.E. showed a disc with blurred margin, tortuous vessels dipping to a deeper level at the disc margin, and some retinal hæmorrhages. *Two weeks later there was an attack of severe pain in the eye and complete loss of vision. The conjunctiva was injected and chemotic, the cornea dim, the lids were swollen, and the anterior chamber was full of blood. Vision was reduced to light perception, and the eye was stone-hard. On paracentesis, the anterior chamber filled with blood, pain persisted, and the eye was enucleated five weeks after the first observation. The microscope showed œdema and vacuolation of the different layers of the retina. The lamina cribrosa was retracted, as in glaucomatous cupping, but the cup, especially in its peripheral parts, was almost completely filled with the swollen and inflamed tissue of the disc.

The author has no doubt that in this case the excavation preceded the neuritis, and that the neuritis preceded, and probably caused, the glaucomatous attack which led to enucleation.

A. J. BALLANTYNE.

(6) **Fleischer**, of Tübingen, has examined a large amount of histological material from glaucomatous eyes and some myopic eyes. He has come to the conclusion that in case of glaucoma, where the excavation has not gone too far, Schnabel's vacuoles are almost always present. This conclusion agrees with the results of v. Hippel's research, published two years ago. The vacuoles are of all sizes, and may be very small. In some cases the nerve head is vacuolated like a sponge, and by the loss of its nervous elements it may be reduced to a mere skeleton. In the opinion of the author it is impossible to deny these facts, which are essentially those described by Schnabel. Schnabel's view, that the vacuolization was an essential atrophy peculiar to glaucoma, but independent of pressure, has obtained few adherents. Fleischer has found that in that part of the nerve where the vacuolization is most developed, the pial sheath is thinned and bulged towards the vaginal space. He thinks that this shows that the vacuoles are filled with fluid which is under considerable pressure, and that the cause is lymph stasis in the ocular part of the optic nerve, the direct result of increased intraocular tension. The same vacuoles are at times to be found in the nerve-head of myopic eyes; the author refers these to the abnormally kinked course of the vessels in high myopia, and the deformity of the nerve-head and its surrounding structures, which may possibly cause lymph stasis.

T. HARRISON BUTLER.

II.—OPHTHALMOLOGY AND GENERAL MEDICINE.

- (1) Hoffmann, Rud.—The nose and the exophthalmos of Graves' disease. (Nase und Basedow-Exophthalmus.) *Klin. Monatsbl. f. Augenheilkunde*, Mai, 1912.
- (2) Oloff, Hans.—A case of persistent paralysis of accommodation after diphtheria. (Ein Fall von persistierender Akkommodationslähmung nach Diphtherie.) *Klin. Monatsbl. f. Augenheilkunde*, Mai, 1912.
- (3) Max, Wilhelm.—Atrophy of the iris and epibulbar carcinoma associated with xeroderma pigmentosum. (Irisatrophie und epibulbäres Karzinom bei Xeroderma pigmentosum.) *Klin. Monatsbl. f. Augenheilkunde*, Juni, 1912.
- (4) Gallenga.—Bradycardia after grave ocular trauma. (Fenomeni di bradicardia in alcuni casi di gravi traumatismi oculari.) *La Clinica Oculistica*, July, 1912.
- (5) Oatman, E. L.—Arterio-sclerosis of the retinal vessels (Angio-sclerosis). *Ophthalmology*, July, 1912.
- (6) Alexander, E. W.—The pathological conditions of the eye secondary to disease of the lymphatics of the neck and throat. *Ophthalmology*, July, 1912.
- (7) Bogatsch, G.—Contribution to the ætiology of bitemporal hemianopsia with special reference to diseases of the pituitary body. (Beitrag zur Ätiologie der bitemporalen Hemianopsie mit besonderer Berücksichtigung der Hypophysiserkrankungen.) *Klin. Monatsbl. f. Augenheilkunde*, September, 1912.
- (8) Marmoiton.—On visual troubles caused by dietetic poisoning. (Des troubles de la vision déterminés par les empoisonnements alimentaires.) *La Clinique Ophtalmologique*, 10 septembre, 1912.
- (9) Jeillais.—Three cases of aneurism of the central retinal artery in the course of pregnancy. (Trois cas d'embolie de l'artère centrale de la rétine au cours de la grossesse.) *La Clinique Ophtalmologique*, 10 septembre, 1912, and *Bull. et Mém. de la Société Française d'Ophtalmologie*, 1912, p. 244.
- (10) Danis, M. and Geerts, J.—A case of tumour of the pons-cerebellar angle. *Ophthalmology*, October, 1912.
- (11) Bettremieux.—Considerations on the blindness which follows acute post-hæmorrhagic anemia. (Considérations sur la cécité consécutive à l'anémie aiguë post hémorrhagique.) *La Clinique Ophtalmologique*, 10 novembre, 1912.
- (12) Uhthoff, W.—On the diagnostic value of unilateral choked disc and optic neuritis and unilateral exophthalmos in intracranial diseases. (Zur diagnostischen Bewertung der einseitigen Stauungspapille resp. Neuritis Optica und des einseitigen Exophthalmus bei interkraniellen Erkrankungen.) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1912.

- (13) **Semple, N. M.**—On certain ocular phenomena in their relation to the diagnosis of intracranial disease. *American Journal of Ophthalmology*, January, 1913.
- (14) **Salzmann.**—On the anæmic fundus. (Ueber den anämischen Fundus.) *Zeitschrift für Augenheilkunde*, Januar, 1913.

(1) As a laryngologist, **Hoffmann**, of Munich, points out the fact, apparently not yet realised by ophthalmologists, that the exophthalmos of Graves' disease can be influenced by intranasal treatment. In many cases, after galvano-causis of the nasal mucosa, the exophthalmos of the same side has disappeared within twenty-four hours. This is attributed to a reflex influence on the smooth muscle of the orbit. A. J. BALLANTYNE.

(2) Paralysis of the accommodation following diphtheria usually disappears within a short time. **Oloff**, of Kiel, has been able to find only three cases in the literature where it lasted longer than six months. His patient was a naval seaman, aged twenty years. When seen by the author, he had only 1 D. of accommodation in the right eye, and none in the left. There was a history of a febrile throat affection four years earlier. Its nature was not definitely known, but after excluding syphilis, tabes, mutiple sclerosis, diabetes, the various intoxications, etc., and especially influenza, the author concludes that it must have been diphtheria. He reminds us that the bacillus is supposed to produce: (1) a toxine, which causes the local lesion of diphtheria, and (2) a toxone, which is responsible for the paralytic symptoms. Paralysis of accommodation is probably due to the action of the toxone on the small-celled, unpaired, median nucleus. A. J. BALLANTYNE.

(3) Eye complications are not often observed in xeroderma pigmentosum. **Max**, of Prague, describes an instance of the condition observed eleven years ago by **Elschnig**, namely, atrophy of the iris and epibulbar carcinoma in association with this disease. In his opinion, the case supports the contention of **Elschnig**, that the iris atrophy is analogous to the skin atrophy in this condition. The young man who is the subject of this paper had a sister, also suffering from xeroderma pigmentosa, with epibulbar tumours, but with normal iris; while another sister had died of xeroderma pigmentosum. A. J. BALLANTYNE.

(4) **Gallenga** has observed as a sequel to severe injury of the eye, a condition of bradycardia which may persist for many days. In all the cases reported, **Gallenga** has noted that there was damage of the posterior segment of the eye, and that symptoms did not occur if the anterior segment alone were damaged. He concludes that there is probably some connection between the damage to the ciliary nerves near the entrance of the optic nerve and the bradycardia, through the sympathetic system. He hopes that further clinical investigations and experiments may be able to throw light on this obscure point. HAROLD GRIMSDALE.

(5) **Oatman**, of New York, gives a very readable account of the changes to be looked for in sclerosis of the retinal vessels. Following **Thoma**, he states that in the early stages we find dilatation, tortuosity, and locomotor pulsation of the arteries, due to loss of elasticity and contractility. Small vessels, previously invisible, come into view, and distension of the capillaries causes redness of the disc. In the next stage proliferative changes in the arterial wall cause rigidity, and the tortuosity and pulsation tend to disappear. The arterial walls become more or less visible, acquiring the "silver wire" appearance or showing as white lines along the course of the vessel. The arterial lumen is narrowed, and the arteries seem to constrict the underlying veins. In the more advanced stage irregular narrowing of the lumen and small aneurysmal

dilatations may occur. Dilatation is more common in the veins, and corkscrew tortuosity of the terminal veins is characteristic. The disc becomes congested and sometimes even œdematous. The arterial changes are always accompanied by venous changes. These may take the form of white lines, patchy opacities in the walls, local narrowings, collateral venous channels taking up the function of obstructed veins, knob-like swellings on the veins, and venous hæmorrhages. The occurrence of the progressive or centripetal venous pulse is supposed to be characteristic. Spontaneous subconjunctival hæmorrhages, transient chemosis, and œdema of the lids, are mentioned as other symptoms of arteriosclerosis.

The ætiology is still doubtful in many cases. Some factors which determine the occurrence of retinal vascular changes are—age, the male sex, laborious occupation in a cold damp atmosphere, heredity, gout, rheumatism, syphilis, chronic nephritis, and diabetes. They may be traceable to lead, alcohol, tobacco, phosphorus, and other drugs, intestinal auto-intoxication, infective fevers, etc.

The histological aspect of the subject is at present very incomplete, owing to the difficulty of correlating the ophthalmoscopic and microscopic appearances. Changes, both proliferative and degenerative, have been found in all the coats of the vessels.

A. J. BALLANTYNE.

(6) **Alexander**, of San Francisco, expresses the opinion that obscure and recurring inflammations of the eye—conjunctivitis, keratitis, iridocyclitis, choroiditis, retrobulbar neuritis, and functional muscular disorders—are often due to soluble toxic products from diseased tonsils, adenoids, or cervical glands, which reach the eye by the lymphatics or the general circulation. This is particularly true in children and in the tuberculous affections of the eye. In the course of his communication he gives examples of these conditions relieved by removal of tonsils and adenoids, local and constitutional measures being employed at the same time.

A. J. BALLANTYNE.

(7) **Bogatsch**, of Breslau, tabulates and analyses the cases of temporal hemianopsia, 315 in number, which he has been able to trace in the literature. Of these, 40 per cent. were believed, on various grounds, to be due to affections of the pituitary body, while in 18 per cent. no cause could be found. It is of interest to note that if the cases before 1886 and those occurring after that year are compared, the percentage of cases attributed to pituitary diseases is very much higher in the later group. In the earlier group five per cent. were diagnosed as the result of disease of the pituitary body, and in 40 per cent. no ætiology could be discovered, while in cases after 1886 the figures were 50 per cent. and 13 per cent. respectively. This difference is attributable chiefly to two causes. It was in 1886 that Pierre Marie drew attention to the association between acromegaly and tumours of the hypophysis, and, further, the diagnosis of lesions of the pituitary body has been greatly facilitated by the introduction of the Röntgen rays. The diagnosis of these lesions rests upon three points, *viz.*, temporal hemianopsia, the "habitus" of the patient, and the characteristic radiogram. Any one of these is suggestive, and, if all are present, the diagnosis is certain. It is to be remembered that in some cases a temporal hemiachromatopsia or relative paracentral scotoma may represent the early stage of a hemianopsia.

The author is not at all sure of the accuracy of Fuchs's claim to have observed temporal hemianopsia in five cases of tabes. The cases presented some features which lead him to doubt their tabetic character, and confirmation of the diagnosis in such a case by *post-mortem* examination is needed before we can accept Fuchs's view.

A. J. BALLANTYNE.

(8) The longish article by **Marmoiton** on the effects on the eye of food

poisoning, is scarcely suitable for abstract, although interesting in itself. At the same time a knowledge of this subject is probably of more importance to Continental readers than to ourselves, since we tend to consume our food more thoroughly cooked, and perhaps also in a less risky state with regard to putrefaction than do our neighbours across the Channel.

While not committing oneself to give a *résumé* of the whole article, which deals with diagnosis, ætiology, pathogenesis, pathological anatomy, prognosis, prophylaxis, and treatment, one may set down something of what the author has to say about the nature of the visual troubles.

Edema of the eyelids sometimes occurs. Vascular and secretory affections of the conjunctiva and lacrymal gland are rare. Keratomalacia has once been recorded. Ophthalmoplegia is one of the commonest ocular manifestations of alimentary poisoning. It shows itself in disorders of the pupil, of the ciliary muscle, and of the extrinsic eye muscles. The intrinsic muscles are more frequently affected than the extrinsic. Mydriasis is common, but is not necessarily marked in proportion to the severity of the intoxication. It varies from a mere paresis to a complete paralysis of the sphincter. As a rule, paralysis of the sphincter is associated with paralysis of accommodation. Myosis has been recorded a few times in poisoning by fish. A single case of *monolateral* paralysis of the sphincter and ciliary muscle has been recorded by H. Villard, and Borsch saw a case of unilateral mydriasis due to poisoning by oysters.

Although it is possible that all the extrinsic ocular muscles may be paralysed, together or separately, since alimentary poisons may reach the cranial nerves, the author has only been able to find one observation, by Guttmann, in which it was expressly stated, that there was a total ophthalmoplegia externa. Whether or not the absence of the fourth and fifth nerves from the accounts by various writers is due to insufficient study, it remains the fact that in published reports of cases it is usually the third pair of cranial nerves that is involved, in whole or in part.

Optic neuritis has once been observed, associated with motor paralysis.

"Along with diplopia, photophobia and amblyopia form the group of subjective symptoms most often reported. Often enough the visual acuity is diminished. Certain patients complain at first only of indistinct vision . . . and then amblyopia increases. In some cases the lowering of vision goes on to complete but transient amaurosis. In this way one of the patients whose histories were published by Roeser, became blind, and recovered the sight only after an attack of vomiting."

ERNEST THOMSON.

(9) If Jeillais, of Nantes, had added to the title of his article words to show that the patients were healthy women, the title would then have expressed the essential fact in these three cases.

While the cases themselves are of great interest, one feels that the author, in attributing the embolic process to the increased fibrin content of the blood in the last three months of pregnancy, is merely speculating as to the ætiology. One cannot help wondering whether the author is justified in making the following statement:— "We have learned also how a pregnant woman, without any pathological antecedents, and in spite of the integrity of her organs, was protected neither from the occurrence of embolism of the central retinal artery nor from its serious consequences." If such really be fact, it is of the utmost importance that confirmatory cases should be brought forward by others.

S. E.

(10) The patient, a female of 22 years, suffered from loss of muscular power in the hands and arms, choked disc, vomiting, headache, vertigo, intellectual failure, tachycardia, and muscular atrophy. Along with these signs of

intracranial pressure, there were symptoms of localising value, namely, total paralysis of both divisions of the auditory nerve, and partial palsy of the fifth, external branch of the third, the twelfth, and the tenth. A decompressive trephining (without opening the dura) was followed by reduction of the swelling of the disc, and temporary improvement in vision, but with subsequent loss of vision and the development of left homonymous hemianopsia. At a later operation one of the cerebral sinuses was opened and the hæmorrhage proved fatal. The tumour was found and enucleated with the finger. It turned out to be a glioma growing in the pons-cerebellar angle.

A. J. BALLANTYNE.

(11) The upshot of the article by **Bettremieux**, of Roubaix, is that, first, the blindness which follows severe hæmorrhage from any part of the body is caused by retinal ischemia due to the phenomenon that arterial blood cannot enter the eye owing to the low blood-pressure relative to the intra-ocular tension, while venous blood cannot get out of the eye owing to the lack of *vis a tergo*; secondly, that the operation of simple sclerectomy should be performed in these cases, because it facilitates the venous exit without lowering the intra-ocular tension. Operations such as iridectomy lower the intra-ocular tension and may lead to intra-ocular hæmorrhage. ERNEST THOMSON.

(12) **Uhthoff**, of Breslau, read a paper of extreme value before the Heidelberg Congress in August, 1912, valuable because of the world-wide reputation of its author in questions appertaining to the relationship of ophthalmology to medicine, and because it practically shows that Sir Victor Horsley's views with regard to the diagnostic value of choked disc cannot be accepted in their entirety.

It must be noted that Uhthoff carefully distinguishes between choked disc and optic neuritis.

Unilateral choked disc in tumours of the cerebrum occurred in Uhthoff's material in 56 per cent. of the cases on the side of the tumour, in 44 per cent. on the opposite side. Horsley's view is not confirmed in this type of case. In the large majority of cases tumours on the convexity of the cerebral hemispheres are chiefly concerned in causing unilateral choked disc, both ipsilateral and contralateral. Basal tumours caused ipsilateral choked disc three times as frequently as contralateral. Callosal tumours and those in the neighbourhood of the primary ganglia were less apt to cause unilateral choked disc, and when it did occur it was as frequently upon the same side as upon the opposite.

Unilateral optic neuritis without choking corresponded more frequently to the side of the tumour; in fact, the tumour was ipsilateral in 75 per cent. of the cases, and contralateral in 25 per cent.

Bilateral choked disc and optic neuritis with greater development on one side indicated the position of the tumour in 73 per cent. of the cases. In the remaining 27 per cent. the tumour was found on the side on which the neuritis was less marked. In this case also cortical tumours were most frequent. When the tumour was a basal one, it practically always lay on the side on which the neuritis was most developed.

In a special group of cases, rare ones, there is *unilateral optic atrophy* either simple descending atrophy or neuritic, (? post-neuritic), *combined with early choked disc on the opposite side*. The atrophic nerve has generally caused blindness. This combination indicates a basally situated tumour causing direct compression of the optic nerve and extensive spread to the opposite side. The diagnosis is confirmed when the olfactory nerve is implicated. In one of these cases Küttner successfully removed such a growth, which was as large as a small apple.

Uhthoff cannot confirm Horsley's statement that the presence of severe retinal hæmorrhages on one side helps to localize the side upon which the tumour may be found. In his material the tumour was ipsilateral in about half the cases only, contralateral in the remainder.

In *cerebellar tumour* unilateral choked disc or optic neuritis is relatively infrequent, and we cannot conclude that the tumour is always upon the side of the papillitis. Uhthoff found it ipsilateral in about half the cases. On the other hand, if there were a double papillitis, in three-fourths of the cases the tumour was ipsilateral with the most advanced papillitis.

The net result is that unilateral optic neuritis affords no real diagnostic information as to the situation of the tumour, but if there is a double papillitis the tumour is more liable to be found on the side of the severest neuritis or choking. The paper says nothing about the age of the neuritis, a point upon which Horsley lays special stress, but perhaps the age of the process is often a matter of opinion.

Basal unruptured aneurysms caused choked disc in only 10 per cent. of the cases. Unilateral choked disc is very rare in this disease and when it does occur, it is due to aneurysm of the internal carotid pressing directly upon the nerve. In such cases simple atrophy is as common as choked disc.

Tumours of the *hypophysis*, the *pons*, the *corpora quadrigemina*, the *geniculate ganglia*, the *IVth ventricle*, and the *auditory nerve* never seem to cause optic neuritis.

Cerebral Abscess.—In 13 per cent. of the cases of choked disc due to cerebral abscesses it was unilateral and in four-fifths of the cases it was ipsilateral with the abscess. The same is true when there is a bilateral neuritis, four-fifths of the abscesses were on the side of the severest neuritis.

Simple optic atrophy without choking was found in 21 per cent. of all cases of cerebral abscess and in one-eighth of these cases it was confined to one eye. In these cases the abscess was almost always ipsilateral. The occasionally seen hyperæmia of one papilla was also always ipsilateral. In general, we may say that hyperæmia of one disc, unilateral neuritis, or more advanced neuritis points to the ipsilateral position of the abscess in the proportion of 12 to 1.

In *cerebellar abscess* choked disc was detected in 23 per cent. of all cases. In 4 per cent. it was unilateral and in 1 per cent. it was more developed on one side. In these cases the tumour was always ipsilateral, supporting Horsley's view absolutely.

In *cerebral syphilis* a unilateral choked disc denoted a gummatous process in the optic nerve trunk with basal syphilis. 14 per cent. of these cases developed papillitis, which was unilateral in 1 per cent. 12 per cent. developed *simple neuritis* and in half the cases it was unilateral.

Cerebral hæmorrhage and *softening* are not associated with unilateral optic neuritis or choked disc. In fact, optic neuritis is rare in these affections (11 per cent. in hæmorrhage, 4 per cent. in softening).

Pachymeningitis hæmorrhagica and *hæmatomata of the dura mater* may occasionally cause unilateral optic neuritis, but more usually cause bilateral neuritis. In other forms of *meningitis* choked disc is very rare and is never unilateral. *Optic neuritis* is commoner. It was found, for example, in 25 per cent. of cases of tuberculous meningitis, and was unilateral in 5 per cent.

In *epidemic cerebro-spinal meningitis* unilateral neuritis is rare. Uhthoff found bilateral neuritis in 17 per cent. of the cases, and unilateral in 1 per cent. only. In uncomplicated otogenous meningitis optic neuritis is very rare, and choked disc almost unknown.

Sinus thrombosis.—The marasmic form of thrombosis of the longitudinal

sinus rarely causes choked disc or optic neuritis, and it is never unilateral. These conditions are equally rare in *septic thrombosis*.

A unilateral thrombosis of the cavernous sinus may cause papillœdema, but it is associated with affections of the orbit, exophthalmos, lid œdema, and other well-known symptoms.

Otitic sinus thrombosis causes choked disc in 18 per cent. of the cases, but most of these are complicated with hydrocephalus internus, meningitis, cerebral abscess, etc. *Optic neuritis* was met with in 24 per cent. of the cases, but it was rarely unilateral or valuable in determining the affected side. Most of these cases, too, were complicated with other intra-cerebral septic processes.

In *fractures of the base* ascending atrophy was double as common as inflammatory changes in the papilla. This was usually bilateral when present, and was generally caused by hæmatomata in the vaginal sheath.

In *tower skull* the optic neuritis is always bilateral. *Optic neuritis*, and less frequently choked disc, are relatively common. It is more generally bilateral (3:1) and is always caused by peripheral affection of the nerve trunks themselves.

The various *intoxications* always cause a bilateral optic neuritis and never a unilateral one.

Unilateral exophthalmos in intracranial disease.—One can only ascribe this symptom to intracranial disease when direct orbital disease can be definitely excluded.

In *cerebral tumours* exophthalmos is caused by metastases in the orbit, but it may be due to pressure upon the orbital reflex veins, especially the cavernous sinus. When unilateral it is ipsilateral with the tumour. 50 per cent. of the cases were basal tumours, 40 per cent. cortical, and in 10 per cent. the tumours were internal.

Cerebellar tumours caused unilateral exophthalmos in only 10 per cent. of the cases.

Basal aneurysms may cause unilateral exophthalmos, by dilating the ophthalmic artery or compressing the sinus cavernosus.

Cerebral abscess is a rare cause of exophthalmos (3 per cent.). *Cerebellar abscess* is a rarer cause (2 per cent.).

Marasmic sinus thrombosis rarely causes exophthalmos, but it is very common in *septic sinus thrombosis* (70 per cent.). It is generally unilateral and is associated with inflammatory orbital symptoms.

Oxycephaly causes double exophthalmos by dislocation of the orbital walls.

T. HARRISON BUTLER.

(13) **Sample**, of St. Louis, discusses various eye signs of intra-cranial disease. He refers to Cushing's point that transient abducens paresis may be an important, and often the earliest, sign of increased intra-cranial pressure. Cushing's explanation that this paresis is caused by direct pressure of the basilar artery upon the nerve in its course over the pons may not always be the correct one. In certain cases a more probable explanation seems to be direct pressure upon the nerve as it lies either between the growth and the pons or between the growth and the bony structure beneath. No explanation has been given, to the author's knowledge, of abducens paresis as an early symptom of tabes.

The oculomotor nerve seems to escape any effect of an intracranial tension, and is rarely directly affected by any growth at the base of the skull. In the great majority of cases its involvement is nuclear. Paralysis of accommodation with dilatation of the pupil strongly points to cerebral syphilis.

In homonymous hemianopia there are certain conditions of value in localizing the disease process. Where there are sector defects with the part

peripheral to the defect intact, or with more or less complete hemianopsia with central vision unaffected, an involvement of the cortical area is indicated. On the other hand, when the involvement of the fields extends from the periphery centralwards, eventually including the macular fibres, especially when both crossed and uncrossed fibres are affected either above or below, the process is evidently in the tracts.

Three illustrative case-histories are given by Semple.

ERNEST THOMSON.

(14) **Salzmann**, of Graz, contributes an article upon a subject which has been little noticed, *viz.*, the ophthalmoscopic appearance of the fundus in the various kinds of anæmia. A coloured plate of four paintings by the author himself accompanies the paper. The first drawing was made from a child with pernicious anæmia. The essential point is the transparence of the blood column. The vessels look much brighter upon the papilla than upon the retina. Upon the disc the reflex is barely visible, and the sharp edge of the nerve head shimmers through the blood column. The papilla is slightly pale; the retina is normal in colour.

The second picture was taken from a child with splenomegaly and chronic anæmia. Here, again, the blood column is transparent, but the obvious alteration is the lack of distinction between veins and arteries. The papilla is not pale and the fundus is rather yellowish with marked granulation. The third drawing represents the fundus of a child with aplastic anæmia. This fundus has an even more granular appearance than the last. The blood vessels are pale, appearing as pale red bands devoid of any reflex. The papilla is red, but there is no distinction between the colour of the temporal and nasal side. The whole fundus is yellowish and very granular.

The fourth case is again one of aplastic anæmia, whatever this may mean. The vessels are pale, and the smaller branches barely recognisable. The veins are tortuous in the periphery. The fundus is yellowish and granular. The paper is worthy of study.

T. HARRISON BUTLER.

III.—BUPHTHALMOS.

- (1) **Brown, Samuel Horton**.—Notes on a case of unilateral buphtalmos, in which a positive Wassermann reaction was obtained. *American Journal of Ophthalmology*, January, 1913.
- (2) **Coronat**.—Congenital elephantiasis and infantile glaucoma. (Eléphantiasis congénital et glaucome infantile.) *La Clinique Ophthalmologique*, 10 février, 1913.

(1) **Brown**, of Philadelphia, considers that his case is of interest, because it is perhaps one of the earliest instances in which buphtalmos, usually regarded as a sequence of congenital syphilis, has been shown to be present in scientifically proved congenital syphilis. The observation of Schwenk, that, while the eye is large, the refraction is usually hyperopic, or compound hyperopic astigmatism, was confirmed in the present case.

ERNEST THOMSON.

(2) **Coronat**, of Lyons, reports the very interesting case of an infant who had congenital chronic œdema of the lower limbs and infantile glaucoma. He suggests that the combination here present makes one think of the possibility that certain forms of glaucoma, hydrophthalmos in particular, may have, as the primary lesion, œdema of the vitreous, as certain authors have maintained.

ERNEST THOMSON.

IV.—RESEARCHES UPON OCULAR SYPHILIS.

Igersheimer, Jos.—Experimental researches upon ocular syphilis. (Experimentelle Untersuchungen zur Syphilis des Auges.) *Bericht der Ophthalmologischen Gesellschaft, Heidelberg, 1912.*

Igersheimer, of Halle, has been successful in producing inflammation of the eye by injecting cultures of the *Spirochæta pallida* into the carotid arteries of rabbits. Some of the experiments were carried out with mixed cultures, but in others he used a pure culture obtained from Dr. Sowade, of the University skin clinic at Halle. A day after the injection changes can be detected in the fundus, grey or whitish foci of various sizes and shapes appear. These may develop into definite *plaques* of choroiditis. The primary condition is an acute choroiditis, the retina suffers secondarily. Sections of these eyes, shown to the Congress, are described in the paper. The changes seen can be compared with human congenital syphilis. In some cases Igersheimer noted injection of the ciliary and conjunctival vessels, opacity of the cornea, and exudate and hæmorrhage into the anterior chamber. Phthisis bulbi may follow, or the inflammation may retrogress. In some cases these phenomena are due to embolism from the injection material.

After a latent period, other developments appeared.—In one rabbit, a month after the injection, a swelling was seen in the edge of the lower lid, which was hard and covered by a scab. When the scab was removed, an ulcer remained, which contained the *Spirochæta pallida*. The animal died from a large ulcer over the sacrum. A second rabbit developed a swelling in the upper lid, which softened and evacuated an oily mass. Parenchymatous keratitis developed in a rabbit which had been injected with a pure culture of *Spirochæta pallida*, but the organisms could not be detected in the cornea. In this case there was very little histological evidence of iritis.

Iritis was, however, frequently seen, and in one case it took the form of iritis papulosa. Atrophy of the optic nerve was observed many times.

Igersheimer contends that he has succeeded in producing conditions in the rabbit's eye, which are in every way comparable with human syphilis, by injecting pure cultures of the *Spirochæta pallida* into the arterial circulation of the head.

T. HARRISON BUTLER.

V.—OPERATIONS FOR GLAUCOMA.

- (1) Stock, W.—The results of Elliot's trephining for glaucoma. (Ueber die Erfolge der Glaukومتrepanation nach Elliot.) *Klin. Monatsbl. f. Augenheilkunde*, Oktober, 1912.
- (2) Gilbert, W.—The question of operation in glaucoma. (Zur Frage der Glaukومتoperation.) *Klin. Monatsbl. f. Augenheilkunde*, Dezember, 1912.
- (3) Dor, Louis.—The new anti-glaucomatous operations. *Ophthalmology*, January, 1913.
- (4) Schnaudigel.—Elliot's trephining for glaucoma. (Die Elliot'sche Trepanation bei Glaukom.) *Bericht der Ophthalmologischen Gesellschaft, Heidelberg, 1912.*

(1) **Stock**, of Jena, writes a most useful article on his experiences with sclero-corneal trephining in glaucoma. Probably the most valuable feature of it is the inclusion of the histories of 33 cases. Though briefly sketched, they contain the essential details of the visual acuity before and after operation, the results of medicinal treatment, if any, the condition of the visual field, and the results of repeated measurements with the tonometer. Stock classifies his cases as "simple" and "inflammatory." The first group includes 20 eyes of 15 patients. After trephining, vision was improved in 8, unaltered in 10, and worse in 2. Tension was reduced satisfactorily in 16. In the second group there were 22 eyes of 18 patients. Of these, eight had vision improved, ten had no change, and in four matters were worse. Satisfactory reduction of tension was obtained in 20.

The only complication observed was the occurrence of a slight iritis with synechiæ, but by adopting the early application of atropine after the operation, Stock was able to give all his patients a free pupil.

Stock believes that elevation of tension is the cause of excavation and visual loss, and that reduction of tension is essential. In acute cases he attempts to reduce the tension by medicinal means before operating, stating that no ground is lost in the few hours required to give this a trial. In other cases he advises immediate operation. In all cases Elliot's trephining is the operation of choice. It is easier and less dangerous than iridectomy and all other glaucoma operations. The sooner it is done the greater is the chance of a favourable result. In hydrophthalmus he has never succeeded in reducing the tension for more than a few hours, and he is not prepared to recommend the operation unconditionally in this affection.

A. J. BALLANTYNE.

(2) **Gilbert**, of Munich, complains that the article of Stock, in the *Klin. Monatsblätter*, for October, 1912 (see above), might give the impression that he (Gilbert) advocates immediate operation in every case of acute glaucoma. His position is that he believes that in every case of glaucoma we should aim at reducing the tension as soon as possible. In practice he submits the acute cases first to medicinal treatment, and postpones operation as long as he safely can, in order to try to reduce tension by these means.

A. J. BALLANTYNE.

(3) This translation of a paper by **Dor**, of Lyons, gives an interesting account of some of the modern procedures directed to the relief of glaucoma. It appears to have suffered, however, severely in the translator's hands. We note several inaccuracies in the subject matter of the paper. For example, the author attributes to Harman the rectangular flap operation of Herbert. He also credits Argyll Robertson and Blanco with having trephined the anterior chamber and groups these, along with Fergus, as "undecided precursors (of Elliot) who have entertained the idea without rendering it practicable."

A. J. BALLANTYNE.

(4) **Schnaudigel**, of Frankfort-am-Main, read a paper before the Heidelberg Congress in August, 1912, describing his experience with Elliot's operation, which led to a valuable and interesting discussion eminently favourable to the operation. The advantages of the operation are obvious, and the author of the method has stated them in a convincing manner. No instrument need enter the interior of the eye, the depth of the anterior chamber is immaterial, the technique is not difficult, although exact work is necessary, complications are rare, and healing is rapid. Schnaudigel laid stress upon the fact that in many cases the iris need not be touched, or at any rate the sphincter could be left, so that were myotics necessary they could act in a normal manner. Postoperative astigmatism is slight, whereas after an iridectomy, of sufficient size, it may be troublesome. The operation is not always successful, but it has the great

advantage that it can be repeated as often as may be necessary. Again, in cases where iridectomy has failed, trephining comes to the rescue. The author is not at all satisfied with cyclodialysis; he has seen no really good results from it. He prefers the 2 mm. trephine, the 1.5 mm. instrument he thinks is too small, and he would not hesitate to use one 2.5 mm. in diameter. In some cases he has bored two holes close to each other with good effect. He uses a special knife to dissect up the conjunctival flap and the same one to dissect up the limbus. He says that with care there need be no fear of the disc falling into the anterior chamber. The treatment of the iris is considered, and Elliot's recommendations are adopted.

Sometimes a firm cicatrix forms with slight encleisis of the iris. This condition seems very favourable in reducing tension. The author has trephined twelve times and intends to continue with the operation, more especially as intelligent patients, who have had previous iridectomies and sclerotomies, prefer the Elliot method.

Discussion.

Stock, of Jena, has trephined 54 eyes by Elliot's method, using the 1.5 mm. instrument, and warmly recommends it. It is, he says, necessary to employ atropine on the second day, because irritation of the iris is common.

Kuhnt, of Bonn, has adopted the method, and has so far seen no disadvantages. On the contrary, he confirms the advantages which Elliot claims. He points out that in certain cases in which a glassy and friable conjunctiva has amalgamated with the sclera, in a ring generally about 2 mm. to 3 mm. round the limbus, the operation cannot be correctly performed, because the conjunctiva cannot be reflected. In one of these cases he did a posterior sclerotomy with a 2 mm. trephine, about 8-9 mm. behind the limbus, and he then cauterised the hole deeply into the vitreous with the galvano-cautery. He then replaced the conjunctiva, and the result was satisfactory. An ordinary posterior sclerotomy had achieved no permanent result.

Axenfeld, of Freiburg i. B., pointed out that posterior synechiæ were liable to form after the operation, and so myotics must not be used, but mydriatics.

T. HARRISON BUTLER.

VI.—SUNDRY COMMUNICATIONS ON GLAUCOMA.

- (1) **Rueben**.—On increase of the ocular tension caused by swelling of tissue colloid. (*Ueber Steigerung des Augendruckes durch Quellung der Gewebsskolloide.*) *Bericht der Ophthalmologischen Gesellschaft, Heidelberg, 1912.*
- (2) **Wessely, K.**—Contributions to the study of ocular tension. (*Beiträge zur Lehre vom Augendruck.*) *Bericht der Ophthalmologischen Gesellschaft, Heidelberg, 1912.*
- (3) **Heerfordt, C. F.**—On a valvular action of the vorticosc sinus scleral plate as a cause of the so-called inflammatory glaucoma. (*Ueber eine Klappenwirkung der Vortexsinuscleralplatte als Ursache des sogeninflammatorischen Glaukoms.*) *Bericht der Ophthalmologischen Gesellschaft, Heidelberg, 1912.*

- (4) **Löhlein.**—**Blood examinations in glaucoma patients.** (*Blutuntersuchungen bei Glaucomakranken.*) *Bericht der Ophthalmologischen Gesellschaft, Heidelberg, 1912.*

(1) **Rueben**, of Heidelberg, discusses the views advanced by Fischer, the American physiologist, who ascribes glaucoma to swelling of the colloid substances in the eye, due to absorption of water.* He has investigated the subject, using salt solution, hydrochloric acid, and sodium citrate, to influence the absorption of water by the tissues of the eye. He confirms Fischer's results, although he did not get such an intense action as Fischer did. He found that acidulated normal saline was effective in causing swelling of the eye, so osmosis will not account for the facts. Fischer thinks that all the tissues of the eye, the cornea, sclera, lens, and vitreous, absorb the fluid, but he did not test them independently. Rueben has isolated the vitreous of the eye of the ox and placed it in narrow test tubes with solutions of hydrochloric acid and of sodium citrate. He detected neither loss nor gain in water-content and concludes that the vitreous cannot take part in the swelling. Experiments with the cornea and sclera showed that they swelled enormously in acid solutions, and increased greatly in thickness. This thickening reduces the surface considerably; in fact, it may be reduced by 25 per cent., and this reduction makes the volume of the cavity much less and easily explains the rise of tension which ensues when eyes are placed in acidulated normal saline. The rise in pressure is caused by the energy produced by the process of swelling in the capsule of the eye. Using rabbits, Rueben found that subconjunctival injections of from $1/3$ to $1/10$ of hydrochloric acid caused great increase in the intra-ocular tension. The retinal vessels got thin, and ultimately shadow-like. The blood is squeezed out of the eye. The rise of pressure depends upon the concentration of the acid injected and the volume used. The addition of salts inhibits the action of the acid.

In cases of glaucoma the author has not succeeded in reducing the tension by subconjunctival injections of sodium citrate. Haffe records his failure to confirm Fischer's statement that this salt is able to lower the high tension of glaucoma.

T. HARRISON BUTLER.

(2) **Wessely**, of Würzburg, has investigated the action of amyl nitrate, caffeine, antipyrine, and alcohol upon the eye. He finds that, with the exception of alcohol, they all cause rise of intra-ocular tension, which is due to the dilatation of the peripheral circulation. He points out that intra-ocular tension depends not only upon the blood pressure, but also upon the amount of blood in the eye. There is a marked parallelism between the general blood pressure and the intra-ocular pressure, but the degree of vaso-dilatation has an important modifying influence. He also finds that the movements of the eye raise the pressure. This he has found not only by experiments upon apes, but in the case of an eye he was about to enucleate for epi-bulbar sarcoma. He then made experiments upon the individual extrinsic muscles to determine whether their contraction raised the tension, and to determine the power individual muscles possessed to raise the tension. Apes were employed in these researches. Stimulation of the third nerve raised the pressure about 5 mm. of mercury; the trochlear gave the smallest result; the abducens stood midway between the two. The figures were $\frac{1}{2} : 2\frac{1}{2} : 5$. The paper finally deals with the value of tonometry by the Schiötz' instrument. The elasticity of the sclera is so variable that Wessely thinks that the Schiötz instrument and all others are not to be trusted to give an *absolute* determination of the tension but

* For abstract, see THE OPHTHALMOSCOPE, 1912, p. 712.

it is very useful to determine a difference between the two eyes of the same individual. He would be very loath to operate for glaucoma because the Schiötz reading was high, in the absence of confirmatory clinical signs.

T. HARRISON BUTLER.

(3) **Heerfordt**, of Copenhagen, believes that the so-called inflammatory glaucoma depends upon a venous stasis which may be caused by a fold in the wall of the sinus vorticosus which can act in such a way that it blocks the entrance to the vorticose scleral canal. In three cases of this type of glaucoma in which he examined the eyes histologically, he found that this fold had been pressed against the opposite wall of the canal and had blocked the passage for the blood stream, like a valve. The nature of the mechanism which effects this is demonstrated by some very clever diagrams. Paralysis of the ciliary muscle makes the walls of the sinus looser, and so the valvular action easier, and helps to explain the action of mydriatics in favouring the onset of glaucoma. The tendency to this action may be congenital, the walls of the sinus being from the first loose and thin, or they may become so from degenerative processes due to age and by chronic lymph stasis and congestion.

T. HARRISON BUTLER.

(4) **Löhlein**, of Greifswald, has carefully examined the blood in twenty cases of glaucoma to detect the presence of an abnormal amount of adrenaline, using the frog's eye test introduced by Meltzer-Auer and von Ehrmann. He discusses all the usual tests for adrenaline and shows that they are unsuitable for the discovery of adrenaline in blood and serum, because many of them depend upon colour estimation. He has utterly failed to get any trustworthy results with any of the chemical tests. The results of his examination of the blood of these patients was absolutely negative when the frog's eye method was employed. In three cases only was there a suspicion of doubt. Löhlein concludes that Kleczkowski's methods must have been faulty. This observer detected an enormous excess of adrenaline in the blood of glaucoma patients, and he concludes that, in general, glaucoma is not caused by adrenalinæmia, although in some cases this may be the case. But he admits that his research does not include a sufficient number of cases to speak dogmatically upon the point.

T. HARRISON BUTLER.

VII.—PARINAUD'S Dermo-EPITHELIOMA.

Chaillous, F.—On Parinaud's dermo-epithelioma. (*Sur le dermo-épithéliome de Parinaud.*) *Ann. d'Oculistique*, juillet, 1912.

F. Chaillous, of Nantes, records the case of a man aged 46, who had in his right eye (1) a reddish granular epibulbar tumour, 1.5 cm. by 6 to 8 mm. by 1 mm., situated to the inner side of the cornea and extending as far as the limbus (2) an ulcerated tumour involving the inner third of the lower lid and extending past the angle on to the upper lid. This latter had commenced a year previously as a slight ulceration covered by a crust, and was in direct contact, although not continuous, with the epibulbar tumour, which was said to have begun as a thickening of the conjunctiva following a blow with a piece of stick when the patient was seven years old. There was no pain and no swelling of the preauricular or submaxillary glands. Under chloroform, the epibulbar tumour was excised and the conjunctiva sutured over its site without any craping or cauterisation of the episcleral tissue, and the palpebral tumour was

freely removed without any plastic operation except the insertion of two sutures in the lower part of the wound. Healing was uneventful, and five months later there was no trace of recurrence, the conjunctival scar was supple and free from hyperæmia and there was no dragging on the lid scar, which had almost the appearance of normal skin.

Pathological examination showed that the palpebral tumour was glandular epithelioma. The epibulbar tumour consisted of masses of epithelial cells, some solid and others hollow, surrounded by an abundant fairly muscular connective tissue stroma. Similar growths were first described in 1884 by Parinaud under the name of "dermo-epitheliomata" and subsequently by other authorities under various names (cystic epithelioma, benign cystic epithelioma, epithelial cystoma of the conjunctiva, etc.). These tumours have been regarded as of congenital origin, owing to their commencement at an early age and their situation in the region of the palpebral aperture, but the author points out that the usual characteristics of such growths (*e.g.*, hairs) and the co-existence of other congenital abnormalities have always been absent. They have usually been considered to be benign, but the author considers that his case suggests the possibility of their causing malignant growth in the neighbouring structures by rubbing, and is of opinion that they should always be removed as soon as possible.

R. J. COULTER.

VIII.—CONICAL CORNEA.

- (1) **Siegrist.**—On the ætiology of conical cornea. (*Zur Aetiology des Keratoconus.*) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1912.
- (2) **Granert.**—On the operative treatment of conical cornea. (*Zur operativen Behandlung des Keratoconus.*) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1912.

(1) **Siegrist**, of Berne, published a paper upon the "hydrodiascope" as a valuable means for the optical correction of keratoconus, and in consequence he has during recent years seen an unusual number of these cases. He has made great efforts to discover something about their ætiology, and has studied them very carefully, more especially with reference to alterations in the blood. In all cases he discovered a definite lymphocytosis; these cells were increased in number from 25 per cent. to 40-58 per cent. In all but one case the coagulation-time was quickened. In one case, instead of commencing in 18°, it began in 3°. Other symptoms noted were a dry skin, with little tendency to sweating, a disposition for the hair to fall out, and nervous symptoms. All these symptoms are those generally associated with hypothyroidism. In most of the cases there was evidence of struma, and it is noted that all the strumous patients, with one exception, came from Berne, where struma is endemic.

Louis Dor has published a case of a lady, aged 24 years, who suffered from Graves' disease and bilateral conical cornea. Both affections were cured by the oral administration of thymus. Siegrist says that it is quite impossible to say whether the disease depends upon defective secretion on the part of the thyroid, or upon a disordered secretion of other ductless glands.

T. HARRISON BUTLER.

- (2) **Granert**, of Bremen, has devised an operation for conical cornea which

appears a little drastic.—With the galvanocautery he cauterises an area of the upper limbus 2-3 mm. broad. The cautery is now drawn down to the centre of the cornea and a triangle is made whose apex is the centre of the cornea and whose base is the cauterised area of the limbus. Two days later the patient is anæsthetised and the eschar is scraped away from the corneal surface, the cornea is split from the apex to the limbus along the cauterised area, and the wound is then covered by a Kuhnt's double pedunculated graft of conjunctiva. The pupil is well contracted with eserine before the operation, and Granert says there is no danger of encleisis of the iris; but we doubt it! A month later, that part of the conjunctiva which is still non-adherent is re-transplanted to its original place; or, if it be very thin, it is simply cut away. Eserine must be used for a few days after the section of the cornea.

T. HARRISON BUTLER.

IX.—REMEDIES.

(Fifth Notice.)

- (1) Herff, Otto v.—On the prevention of ophthalmia neonatorum in town and country. (Zur Verhütung der Blennorrhœa Neonatorum in Stadt und Land.) *Archiv für Gynaekologie*, Band XCVIII, Heft 1.
- (2) Rochon - Duvigneaud and Onfray.—Superficial cauterisation of granulations. A contribution to the study of the surgical treatment of trachoma. (L'abrasion ignée des granulations. Contribution à l'étude du traitement chirurgical de la conjonctivite trachomateuse.) *Fondation Ophthalmologique Adolphe de Rothschild: Bullétin et Travaux*: 1911, p. 55.
- (3) Harry, Philip A.—The treatment of the early stages of senile cataract. *Lancet*, 4th May, 1912.
- (4) Lehle, A.—On the prophylaxis of ophthalmia neonatorum. (Zur Prophylax der Ophthalmoblenorrhoea Neonatorum) *Münchener medizinische Wochenschrift*, Oktober, 1912.
- (5) Tschirkowsky, W.—Clinical observations on vaccine and serum therapy in diplobacillary conjunctivitis. (Klinische Beobachtungen über Vakzinotherapie und Serumtherapie der diplobazillären Konjunktivitis.) *Klin. Monatsbl. f. Augenheilkunde*, November, 1912.
- (6) Schnaudigel, Otto.—The radium treatment of Spring catarrh. (Zur Radiumbehandlung der Conjunctivitis vernalis.) *Klin. Monatsbl. f. Augenheilkunde*, November, 1912.
- (7) Calderaro.—Clinical and experimental researches on ocular iontophoresis. (Ricerche cliniche e sperimentali di iontoforesi oculare.) *La Clinica Oculistica*, December, 1912.
- (8) Sattler.—Experiments upon ocular diathermy. (Experimentelles zur Diathermie am Auge.) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1912.
- (9) Wessely, K.—On the treatment of ulcus serpens. (Zur Behandlung des Ulcus serpens.) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1912.

- (10) Schneider, R.—Experimental researches on the serum therapy of pneumococcal infection of the eye. (*Experimentelle Untersuchungen zur Serumtherapie der Pneumokokkeninfektion des Auges.*) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1912.
- (11) Jones, E. L.—Des injections sous-conjonctivales massives de Cy2 Hg avec acoïne et morphine. (Translated title.) *La Clinique Ophthalmologique*, 10 janvier, 1913.
- (12) Bishop, G. T.—Three cases of interest. *British Medical Journal*, January 25th, 1913, p. 169.
- (13) Le Roy, Bernard.—The thiocyanates in the body fluids. *American Journal of Ophthalmology*, February, 1913.
- (14) Thomson, Ernest.—On aseptic, antiseptic, and prophylactic measures in ophthalmic surgery: Observations made in several British and Continental hospitals. *Glasgow Medical Journal*, February, 1913.
- (15) Canilla, G.—Iodine in corneal ulcer. *British Medical Journal*, March 1st, 1913.
- (16) Bronner, Adolph.—Unilateral irido-cyclitis (serous iritis) treated by sub-conjunctival injections of mercury cyanide. *British Medical Journal*, March 22nd, 1913.
- (17) Macnab, Angus.—Ionic medication in herpes zoster. *Lancet*, March 22nd, 1913.
- (18) Ettles, William.—Ionic medication in herpes zoster. *Lancet*, March 29th, 1913.

(1) v. Herff, who is in charge of the Women's Hospital in the town of Bâle, has devoted especial attention to the prevention of ophthalmia neonatorum in the institution, and has succeeded in reducing the incidence of this disease almost to zero. He brings forward evidence which tends to show that the old Credé method with 2 per cent. silver nitrate has not banished infantile blennorrhœa, even in neighbourhoods like Salzburg, where the procedure is enforced by law, although everyone admits that the percentage has been greatly reduced. Legal enactments making the Credé method obligatory, and fixing heavy fines in cases of non-compliance, are insufficient. The disease must be made notifiable, and then the cases can be followed up and supervised by the sanitary authorities. The silver nitrate method has many disadvantages. It has dangers of its own, especially if the solution has been kept and allowed to concentrate by evaporation. It demands a *technique* beyond the skill of the ordinary midwife. The author contrasts the disadvantages with the advantages of sophol, which, he says, may be prepared from tablets with perfect ease, furnishing a solution which is permanent for years if kept in a bottle made of non-actinic glass. He finds that it is non-irritating, and as powerful a disinfectant as protargol and argyrol. He gives no proof of this statement, the accuracy of which we doubt. Our researches, carried out in Palestine, proved conclusively that protargol, although more painful than argyrol, was much more efficient in curing Koch-Weeks' muco-purulent conjunctivitis, and the small experience we have had of sophol has led to a similar conclusion. We understand that sophol is of the argyrol type, containing a large amount of silver, but not in an ionised form.

Herff's results with protargol, argyrol, and sophol are practically identical: they all reduced the case incidence almost to zero. Probably, for the Credé

method, argyrol and sophol are both equally good, and have sufficient germicidal properties for the purpose. Personally, we should use protargol, although it might occasionally cause a little irritation. Any of these is better than silver nitrate, a useful agent only in skilled hands. We still see cases of gonococcal conjunctivitis which yield to a 2 per cent. solution of nitrate of silver when the organic salts have failed.

T. HARRISON BUTLER.

(2) **Rochon-Duvigneaud and Onfray**, of Paris, recommend a form of cauterisation which differs in some respects from that which is usually practised in trachoma. The aim is to produce a universal superficial excoriation rather than a deep cauterisation. The method was introduced in 1911, by Dr. Miclesco, of Jassy. Local anæsthesia is sufficient, except in the case of young or nervous patients, and the fornices should be well distended by an injection of adrenalin and cocain. The cautery has the form of a broad flattened knife, is used at a dull red heat, and is passed over the whole surface of the tarsal conjunctiva and fornices. The caruncle should not be forgotten, care being taken of course not to cauterise the puncta. After the operation, the conjunctiva has a dry, chamois-leather appearance. Saline douching and cold applications, changed every two hours, are used.

On the following day the lids are swollen, red, indurated, and covered with a false membrane. The pain is supportable. After eight to ten days the false membrane is exfoliated or absorbed, leaving a velvety surface with small points of hæmorrhage; there is some catarrhal discharge. The conjunctiva now rapidly cicatrises, leaving a smooth, supple, mucous membrane. In some cases, a few prominent buds remain, which should be touched with the mitigated silver nitrate stick. Usually, in from three to four weeks the cure is complete, or if any granulations are left, a limited operation of the same kind may be undertaken. There is no deep cicatrisation, and the authors have never observed incurving of the tarsus. Symblepharon is more to be feared, but may be prevented by passing a blunt glass rod daily up into the fornix. Slight complications on the part of the cornea were observed in one case only; during the operation it should be well protected by means of a metal guard, and afterwards argyrol drops and iodoform ointment should be used.

GEORGE COATS.

(3) **Harry**, of Rochdale, commenting in a letter to the Editor on the paper by Lt.-Col. Smith, which appeared in the *Lancet* of April 20th, 1912,* says:—"Following on the lines laid down by Professor Darier, I have been using that form of treatment (*i.e.*, subconjunctival injections of cyanide of mercury), for the past six or seven years in more than 2,000 cases, and have found it a valuable addition to ocular therapeutics. I can confirm many of Lt.-Col. Smith's statements. He will, however, find that as far as lenticular opacities are concerned the improvement is only temporary . . . Lt.-Col. Smith is not exaggerating when he remarks that it is necessary in order to control the pain to put the patient under chloroform and to give him a hypodermic of at least a third of a grain of morphia. . . ."

ERNEST THOMSON.

(4) **Lehle**, of Munich, has made extensive use of solutions of silver nitrate, of silver acetate, and of sophol for the prophylaxis of infantile ophthalmia. He confirms the well-known fact that both the nitrate and the acetate of silver cause much irritation, although when intelligently used, they are very efficient in preventing the development of the disease. Sophol was used in 2,500 cases in 5 per cent. solution. In 90 of these cases there was no irritation whatever, and not one case developed ophthalmia neonatorum.

T. HARRISON BUTLER.

*For abstract see THE OPHTHALMOSCOPE, 1912, p. 420.

(5) Following on the work of Reis, **Tschirkowsky**, of Kasan, has instituted some experiments on the treatment of diplobacillary conjunctivitis by vaccines and immune serums. Reis found that the blood serum of patients suffering from diplobacillary catarrh showed no increase in opsonins and bacteriolysins for the diplobacillus, but that the serum of actively immunised rabbits contained agglutinins and bacteriolysins specific against the organism. He recommended the use, by local instillation, of this immune serum of the rabbit, and claimed that it led to improvement in the clinical symptoms and reduction in the number of bacilli in the conjunctival sac. Tschirkowsky has tried vaccine treatment of eighteen cases, twelve of which could be followed for some time. The vaccine was made from a twenty-four hours' culture on ascitic agar, mixed with physiological saline solution, sterilised for one hour at 60 degrees Centigrade, and emulsified by shaking for half-an-hour. Doses of 1 to 2 c.cm. were administered at weekly intervals, not more than four doses being given in any one case. Cure was never obtained by this method. Often the first injection caused reduction or disappearance of the organisms, but these returned after cessation of the injections. In the blood of patients treated in this way agglutinins were found in greater amount than in normal blood. The author thinks it possible that with alterations in dosage and *technique* better results might be obtained. In his cases the vaccine was the only treatment employed. Probably the addition of local treatment would give better results. Using an immune serum, as recommended by Reis, Tschirkowsky obtained in ten to fifteen days some improvement in appearance and reduction of the diplobacilli.

A. J. BALLANTYNE.

(6) **Schnaudigel**, of Frankfurt, records the case of a patient in whom spring catarrh was very severe, recurrences of increasing seriousness having been observed over a period of five or six years. Ten milligrammes of radium bromide was applied seven times in one eye and once in the other, the duration of the applications being fifteen to thirty minutes. A radical cure resulted.

A. J. BALLANTYNE.

(7) The use of strychnine in affections of the optic nerve was introduced into the practice of ophthalmology by Nagel in 1871; and it is still the only satisfactory therapeutic method by which the nervous mechanism of the eye can be stimulated. Clinical experience has shown that the alkaloid has the greater effect the more closely it can be brought into relation with the tissues of the eye, and therefore it has been given by injection into the temple and even subconjunctivally. The repeated injections, however, constantly give rise to pain and discomfort, and eventually by the small areas of thickening which surround each puncture, all available regions become impervious, so that no further injection is possible.

Calderaro has attempted to bring the drug into the tissues by means of iontophoresis, and has employed both the cutaneous surface (the temple) and the conjunctiva. He has found the latter path more easy for the passage of the ions, so that five times the quantity enters by this than by the skin. Zahn has recently shown that conjunctival iontophoresis is not without danger; he found that in some cases the corneal epithelium was destroyed and the corneal tissue itself softened, so that it necrosed.

Calderaro found that in some of his animals the cornea suffered, and, therefore, before applying the method to the human subject, he altered the details somewhat. He took an ordinary blepharostat, and wound round each limb absorbent wool moistened in a 1 per cent. solution of strychnine, this took up about 1 cc. The rest of the limbs were wrapped in the gutta percha, except one point which was connected with the positive pole of the current. The tension of the spring of the blepharostat kept the cotton wool

away from the cornea and in good apposition with the fornix of the conjunctiva.

He preceded the application of the current by instilling a few drops of 2 per cent. cocaine. The current was at first 1 ma. and was gradually increased to 3 ma. The patients suffered no inconvenience. Calderaro thinks, from clinical experience, that he is able to affirm the good effects of this method; but to prove more fully that the strychnine is really carried into the eye, he has had recourse to experiments on animals. He submitted rabbits to this process, and, after a few minutes' exposure, he withdrew by a syringe the aqueous humour and injected it into frogs; these suffered from the symptoms of strychnine poisoning. On the other hand, when the electrodes were applied, not to the conjunctiva but to the temporal skin of the rabbit, the aqueous did not set up signs of poisoning in frogs. He estimates that the conjunctival route is five times as good as the other.

HAROLD GRIMSDALE.

(8) **Sattler**, of Giessen, finds that when a rabbit's eye is penetrated by a high frequency current, which raises its temperature far more effectually than hot fomentations, there is a great increase in the albumin content of the aqueous.

T. HARRISON BUTLER.

(9) **Wessely**, of Würzburg, showed to the Heidelberg Congress an instrument, which was heated by steam and boiling alcohol, for application to a hypopyon ulcer. He had obtained good results from its use.

Igersheimer, of Halle, pointed out that he had noted that the severe ulcers which required operation were associated with a rise of the body temperature.

T. HARRISON BUTLER.

(10) **Schneider**, of Munich, supposes that pneumococcal serum acts by increasing the opsonic power of the blood, so that the cocci are more easily absorbed by the phagocytes. If the serum be injected subcutaneously, it takes from seven to eight hours before traces of antibody appear in the blood, and twenty to twenty-four hours before the maximum amount is present. The tears can be shown to contain a small amount of bacterio-tropic substance which is present in the serum of immunised animals. The normal aqueous contains little bacterio-tropic substance, but after puncture, the second aqueous contains sufficient to determine opsonic action. Emulsions of normal cornea show no opsonic power, but in the presence of inflammation, or after puncture of the anterior chamber, opsonins appear, but even in this case a large amount of serum has to be injected.

Schneider finds that, speaking generally, massive doses of anti-pneumococcal serum have to be injected intravenously to attain any practical immunisation of the cornea.

T. HARRISON BUTLER.

(11) The article by **Jones**, of Cumberland, U.S.A., is a communication to the American Medical Association, June, 1912, translated into French. Jones was encouraged to take up subconjunctival injections by the work of Darier, but has evolved some special points of *technique*.—His practice is to give 2 cc. of liquid, no matter what its composition, the age of the patient, or the nature of the complaint. If one wishes to obtain a genuine result, it is necessary to dilate and to flood the ocular lymph channels. In order to prevent the decomposition of acoine by the least trace of alkalinity, Jones adds a little boric acid to his acoine-cyanide solution. The exact method of preparation is given, but as the reviewer thinks there is a mistake in the translation (or, at any rate, an uncertainty) he prefers not to quote it. Apparently, the usual strength of cyanide is 1 in 1,500. After such an injection, there is swelling of the eyelids and frequently of the whole side of the face. Sometimes the chemosis will cover all the cornea except the pupil

area. One need not be alarmed by such reaction. After each injection the conjunctiva becomes adherent over an area the size of the little finger-nail. After eight or ten injections, which may be necessary in very troublesome cases, the whole sub-conjunctival space may be obliterated without any hindrance to the movements of the eyeball or eyelids. On account of the pain, which is sometimes severe in spite of acoine, the author has lately been adding to each injection one-eighth grain of morphine, and the same amount of dionine. 1/100 grain of atropine may be added if it be desired to dilate the pupil. The chemosis does not disappear for from two to four weeks. Usually one injection is sufficient. Jones considers one "blow with a hammer," if powerful, is better than repeated slight blows. In children he gives the same dose as in adults, but employs chloroform. Twenty-four cases are cited, in which the results are certainly surprising. It is interesting to note the variety of these cases, namely, sympathetic ophthalmitis, disseminated choroiditis, iritis and choroiditis, retinitis proliferans, macular choroiditis, tuberculosis of the choroid, interstitial keratitis, glaucoma following retinal hæmorrhage, episcleritis, retrobulbar neuritis, optic atrophy. The method has also been successfully employed by Jones as a means of quieting down badly wounded eyes, so as to avoid, in certain cases, enucleation of the globe. In some cases infection of the vitreous has been checked, and some vision preserved.

ERNEST THOMSON.

(12) **Fleet-Surgeon Bishop**, of Malta, not aware that the local application of tincture of iodine is an old way of treating septic ulcers of the cornea, reports a case successfully treated by that means. The medicament was applied twice a day to the ulcer for five consecutive days.

SYDNEY STEPHENSON.

(13) The age of miracles has evidently returned—in America. The reader is advised to study for himself the article by **Le Roy**, of Athens, Ohio, on the results obtained in *blind eyes* by the administration of sodium thiocyanate.

(14) **Ernest Thomson**, of Glasgow, epitomises in this article most of the Continental operative *technique* which he has already described in detail in the admirable articles on Continental clinics which were published in *THE OPHTHALMOSCOPE* during the year 1912.

(15) **Canilla**, of Cordoba, Spain, obtains striking results by treating corneal ulcers by the daily application of tincture of iodine.

SYDNEY STEPHENSON.

(16) After two sub-conjunctival injections of from 12 to 15 drops of mercury cyanide (1 in 5,000), **Bronner**, of Bradford, obtained a good result in a case of recurrent irido-cyclitis, of unknown cause, in a girl of 26 years. V. was improved from the counting of fingers at 2 metres to 6/6. The cure occupied three weeks, and the treatment also included syrup of the iodide of iron administered internally and the local application of dionine drops.

SYDNEY STEPHENSON.

(17) **Macnab**, of London, gives the clinical histories and the details of the treatment of two cases of herpes zoster in which ionic medication had a most beneficial and indeed curative effect. In the first case the iris was not affected at all, while the cornea suffered from a slight degree of anæsthesia. In the second case there was at the time of examination by Macnab well marked iritis, and there had been pustulation of the cornea at an earlier stage. The first case was seen about the twentieth day, the second not till the fourteenth week after the commencement of the attack. "The drug used was sulphate of quinine applied by means of the positive current over the whole area affected, for fifteen to thirty minutes, with a current of 1 to 1.5 milliampères per square inch of surface. In general (this refers apparently to other cases besides those here detailed, E.T.), two applications at an interval of from seven to ten days were made to the skin area, and the conjunctiva was treated separately for a

shorter time and with less current. The results have been that the neuralgia pains and the disturbed sensibility of the part have cleared up almost at once. The iritis disappeared and the sensation of the conjunctiva and cornea returned. As there is in every case some destruction of tissue, a complete return to the normal cannot be expected, but so far as such appeared possible, this form of treatment seems to provide a cure for this distressing affection." The author states that his treatment was begun empirically and that he is unable to give any explanation of the *rationale* of its action. Regarding the pustulation and scarring which this treatment is unable to cure, he suggests, since this appears to be due to infection of the vesicles by the staphylococci normally present in the skin, that a vaccine might be prepared from the staphylococci and injected before the stage of pustulation has occurred. None of his own cases has been seen early enough to allow of this experiment being tried.

ERNEST THOMSON.

(18) **Ettles**, of London, in a letter to the Editor of the *Lancet* referring to the article by Macnab in the *Lancet*, March 22nd, mentions a case of severe herpes zoster which he had successfully treated by means of 1 per cent. sodium salicylate, five years previously without any return of the complaint. A pad of Gamgee soaked in this solution was placed over the left brow and connected with the negative pole of a battery. The positive electrode was applied to the nucha. A current of ten milliampères was passed for fifteen minutes and the application was renewed on three occasions at intervals of three or four days. After the first ionization there was a remarkable cessation of pain, and after the second there was no discomfort at all. Ettles says that a generation ago the late Sir B. W. Richardson advocated the use of continuous current electrodes soaked in watery solutions of various medicaments as a valuable method of enhancing the effect of the current.

ERNEST THOMSON.

BOOK NOTICES.

The Significance of the Teachings of Heredity in Ophthalmology.
(*Die Bedeutung der Vererbungslehre für die Augenheilkunde.*)
By Professor A. PETERS. Halle: Carl Marhold. 1911. Price, 1s.

In this small *brochure* Professor Peters pleads for a wider recognition of the influence of heredity in ophthalmology, a study which, he remarks, has been more enthusiastically followed in England than in Germany, especially by E. Nettleship and K. Pearson.

Peters considers the various ocular defects in which he believes heredity plays a conspicuous part. Chief among them are deformities, especially colobomata. The observations of von Hippel upon the progeny of a buck rabbit which had an iris coloboma, leave no doubt that such a condition is strongly heritable. Congenital opacities of the cornea are probably not the result of intrauterine ulceration, but are inherited. We accept this explanation with pleasure, for we refuse to believe that such a geometrically regular and symmetrical condition as an anterior polar cataract can possibly be caused by intrauterine ulceration of the cornea, and by an ulceration which may heal and leave no obvious trace. The author does not mention this form of cataract, but he alludes to other varieties of congenital cataract, especially to

lamellar. Strabismus and its associated defects are apt to be hereditary and familial, as Worth has pointed out, and certain errors of refraction are perpetuated from parent to child.

Peter's pamphlet is suggestive, and may stimulate others to investigate a rather dry subject.

T. HARRISON BUTLER.

Text-Book of Ophthalmology in the form of Clinical Lectures. By DR. PAUL ROEMER, of Greifswald. Translated by DR. MATTHIAS L. FOSTER. Vols. I, II, III. London: Rebman Ltd., 129, Shaftesbury Avenue, W.C. Price of Volume III, 10s. 6d. net.

Now that the three volumes of this work have been published, some detailed criticism is allowable. The form taken of clinical lectures is unique in text-books of ophthalmology. All who have gone to any depth in its pages will agree that this book is more adapted for the teacher than for the student. One travels along from case to case, keenly interested in the elaborate description of disease. Roemer says (truly perhaps) that "in clinical instruction we have holidays and work days; sometimes we have to deal with the daily monotony, sometimes with cases that captivate us," but throughout his book every day may be said to be a holiday.

Volume I commences with an introduction to the methods of examining the anterior segment of the eye with its detailed anatomy, as also the physiological changes taking place in old age—he draws particular attention to the usefulness of Zeiss's corneal *loup*, and demonstrates with Hess's osmium lamp the nuclear reflex of the lens to be found after 25 years of age. In the next section we find an ingenious chart for the analysis of corneal opacities, which is soon put to the test of its usefulness by the demonstration of cases. In affections of the conjunctiva, Roemer is perhaps at his best,—he shows us cases of each of the various microbic infections of the conjunctiva with a useful summary as to their course and treatment. He is a firm believer in the use of silver nitrate for acute conjunctival conditions above any of the more modern silver preparations. Being an enthusiast in the specific treatment of diseases according to its ætiology, we are not surprised to find that in his treatment of gonorrhœal ophthalmia, he dusts powdered specific serum into the eyes, and also has serum in the sodium chloride solution for irrigation. In no other part of the book are we more firmly impressed with the advantage to the student of a definite clinical picture of a disease than in the demonstration of cases of trachoma and kerato-conjunctivitis eczematosa. Roemer believes that the latter disease is related to the so-called "scrofulous diathesis," and states that scrofulosis is a disease *sui generis* which is complicated secondarily by tuberculosis in many cases.

Of the corneal diseases, the pneumococcal ulcer overshadows all others. It is gone into most thoroughly in all its aspects; the most sceptical reader would be impressed with Roemer's enthusiasm in treating these ulcers with his specific serum. Those who have seen many cases of *ulcus serpens* caused by the diplobacillus of Morax-Axenfeld will value its clinical study in these pages. We find no mention of Mooren's ulcer nor yet of such rare affections as keratitis marginalis profunda, while nodular and lattice-shaped opacity of the cornea are omitted.

On paper diseases of the iris are most admirably classified into (i) an iritis in which the anterior surface is the part chiefly affected, *e.g.*, iritis rheumatica, iritis gonorrhœica, and iritis urica, (ii) an iritis in which the deeper parts are involved, *e.g.*, iritis syphilitica, iritis tuberculosa. Cases are shown in a

vivid and clear manner to justify this distinction. Few will agree with Roemer in using a myotic in iridocyclitis in lieu of atropine when the latter causes a rise in the tension. We do not find as a cause for iridocyclitis a pyæmic infection, such as pyorrhœa alveolaris, boils, etc., brought to notice chiefly by English authors in recent years, a debatable point undoubtedly, as proof is still wanting of a definite organism being found in the iris tissue. Yet did we deny that iritis syphilitica was caused by the *Spirochæta pallida* before the latter was demonstrated in the iris?

The author next deals with diseases of the lens. A concise and clear description is given of "lens with double focus," which was first brought under the notice of the ophthalmological world many years ago, by R. W. Doyme. In incipient cataract we are told that there is scarcely a case in which opacities cannot be distinctly recognised in the vitreous, and the electric ophthalmoscope is advocated for this purpose—surely this is interesting from a pathological point of view. We find cataracta punctata cœrulea placed amongst the senile forms of cataract; its clinical picture is most instructive, as also its prognosis and treatment. The author regards subcapsular senile cataract as a specific metabolic disease, and believes that both senile and diabetic cataracts are produced by one and the same cytotoxic product of metabolism—although the substances which exert the harmful influence are wholly unknown and their origin can only be surmised empirically. A full account is given of the preparation of the patient for operation, *technique* of the operation, and after treatment. Many useful and practical hints are based on sound reasoning and experience,—“Away with the bandage before the operation”—“dry instruments”—“dry hands”—“no boiling of cutting instruments”—“primary effect of dressing after operation is psychical”—are a few of the practical points. Roemer disregards the mouth protector and covering for the head, which is curiously inconsistent with his thoroughness in other directions. In expulsive post-operative hæmorrhage following on extraction, he advises the old operation of reclination of the lens in the second eye. All other forms of cataract are dealt with in an unabbreviated manner. The rare anterior capsular cataract resulting from bee stings of the cornea is mentioned.

Volume II takes us first to diseases of the eyelids, the account of which leaves nothing to be desired from an operative, clinical, and anatomical standpoint. Injuries of the eye occupy nearly a hundred pages; a more complete and clear account of such injuries has not before appeared in English text-books. Roemer and Fuchs have both had the unique experience of seeing a patient in whom an extraction was performed by the horn of a cow, first in one eye and later in the other, with good subsequent vision.

The theories as to the causation of sympathetic iridocyclitis are minutely criticised. The Leber-Deutschmann migration theory is dealt with as follows (p. 365): “The migration theory cannot be authorised to draw from experiments on animals conclusions as to the symptoms of sympathetic ophthalmia in man, or to explain the pathogenesis of the same through a migration of germs along the optic nerve, until a continuous growth of such pathogenic germs as are dangerous to the eye, but do not endanger the rest of the organism though a general infection, has been demonstrated by it along this track from one eye to the other.” The recent experiments by F. Deutschmann, however, will go far to rehabilitate this somewhat discredited hypothesis. Roemer himself favours the theory of specific metastasis. A useful tariff of indemnity is drawn up as regards injured eyes.

We are brought soon to realize the importance of the accessory sinuses of the nose as a cause of orbital affections—each sinus being separately dealt

with. Kroenlein's operation is fully described and a case exhibited on which it had been successfully performed.

Several pages are devoted to a description of the theories as to the causation of glaucoma. Many experiments are given in the efforts to try to elucidate this baneful disease. But we find ourselves only a little further forward, as the true nature of glaucoma is still unknown, but the energy and unbeaten spirit of man is ever before us while we read. Roemer attaches great importance to changes in the vitreous in the causation of glaucoma, although these changes are not susceptible of a single interpretation. We find it stated that medicinal treatment and myotics should be tried first in every case, no matter what the form of glaucoma. In glaucoma simplex the author prefers conservative treatment in all cases, and believes operation is justifiable only in pronounced hypertony, and he then favours either a cyclodialysis or an anterior sclerotomy. We find no mention of the more modern sclerectomies and trephining operations—a somewhat serious omission. Among the causes of secondary glaucoma we find given "retinitis pigmentosa," "atrophy of the optic nerve of cerebral origin," "choked disc," and coloboma of the optic nerve. Passing on to strabismus, we find its probable causation put before us in a simple and explicit manner. The operation described for the advancement of the external rectus is a combination of the methods of Schweigger and Worth.

Finally, we come to Volume III. The pupil is first of all discussed at length. In the direct reaction to light, we note that irradiation of every part of the retina will not excite contraction of the pupil; on the contrary, Hess has proved that only quite a small area about the macula, of about 3 mm. radius, is pupilomotor; from this it stands to reason that the practical application of Wernicke's hemianopic reaction of the pupil must be left open to question. We are familiarised with the diseases which reveal themselves by derangements in the reactions of the pupils in such a way that we can conjecture or base the diagnosis on the pupillary symptoms alone. We next find ourselves amongst the paralyses of the extrinsic muscles of the eye. The ophthalmoplegias are beautifully classified, and ptosis receives almost more than its due recognition. In the part dealing with the neurology of the eye we are impressed with the great amount of detail gone into with each case; the neurologists report is always forthcoming to confirm the diagnosis made from the eye symptoms alone. Here, at least, we find Roemer forgetting that he is speaking to the general practitioner, while he soars aloft into the domain of specialism. The only disease which gives rise to eye symptoms omitted is myasthenia gravis. The percentage given of the finding of tubercle of the choroid in tuberculous meningitis is 10 per cent., according to Uhthoff. Many years ago it was suggested by Sydney Stephenson and George Carpenter, who actually found tubercle present in 50 per cent. of their cases, that it would be found in 100 per cent., and such has recently been proved to be the case by W. B. Marple.* Choroiditis is discussed in five pages, and diseases of the choroid are finished in ten. In the chronic intoxications causing retrobulbar neuritis, alcohol and tobacco amblyopia are rather summarily dismissed considering the more minute description given of less common affections. In diseases of the retina we find nothing of note, and are more and more convinced that Roemer excels chiefly in his description of external diseases of the eye.

The latter part of Volume III deals with the functional testing of the eye. Here all the points of practical value in dioptrics of the eye are rendered

* See THE OPHTHALMOSCOPE, 1912, p. 559, for Marple's original communication.—EDITOR.

clear with many diagrams. In Snellen's test types the sources of error are found to be: (1) the average vision of the normal eye has been too much underestimated in these charts; and (2) the characters used in the same line cannot be deciphered with sufficient uniformity. Roemer employs artificial light, the chart is made in a quadratic form to obtain a uniform illumination and is placed at five metres distance; he uses Landolt's test types, which he states are the best yet produced.

Myopia has many pages devoted to it. The author regards as the primary cause of this disease an abnormal extensibility and stretching of the sclera, that there is a sort of scleromalacia, analogous to osteomalacia, which develops in some persons during the period of their growth, recovers spontaneously in many cases, leaves behind an elongation of the axis of the eye, but lasts for decades in the malignant cases, and occurs sometimes in one eye alone. He believes this scleromalacia to be a metabolic disease of the eye. In the section on colour-blindness calculations are based altogether on Hering's theory; we agree with Roemer in considering that no method of colour testing should be decisive in which the patient has to name the colour.

The book finishes with an appendix on eye-strain by the translator.

Credit is due to the translator for the fluency and easy reading throughout, as also for clearness and simplicity. Not a few footnotes are added to supply the omissions of the author chiefly concerning procedures that did not originate in his native country, a failure common to many writers. The print is of good size and uniform throughout, but one regrets that it is upon glazed paper, so detrimental to the comfort of the eye. Considering the size of the book, the number of illustrations is restricted, and rightly so, as there is much that cannot be adequately learned from a picture. There are, however, thirteen beautifully coloured plates.

On page 132, "Bowman's" should be substituted for "Descemet's" five lines from the bottom of the page, and on page 338 "choroid" should be substituted for "sclera" at the commencement of the fourteenth line from the top. In the two coloured plates, dealing with the diseases of the lens, we find "By direct light" in the place where "By oblique light" should be, and *vice versa* on the top of the page in each case. Few mistakes in spelling were noticed.

We conclude by saying that the English speaking ophthalmological world will indeed be grateful to the translator for bringing to their notice this great work by one who is born with a glowing love of science, and who is animated only by the wish to be of service to the physician and the patient, to the learner and to the sufferer.

DAVID ST. HELIER HORGAN.

CORRESPONDENCE.

[While THE OPHTHALMOSCOPE will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.]

THE STEPHENSON-WOLINSKI TONOMETER.

To the Editor of THE OPHTHALMOSCOPE.

SIR,

May I present here briefly the results of my observations on the Stephenson-Wolinski tonometer?

I have used the Schiötz instrument, both in my office and in my clinic at the New York Eye and Ear Infirmary, for nearly four years. It is absolutely

reliable and accurate, and I consider it indispensable in ophthalmological work. Repeatedly have I had three assistants familiar with the use of the instrument take the tension of the same eye, and (allowing for the slight difference in the tension when several successive observations are made) the results would differ by only one or two millimetres of mercury. We have two instruments of the same make and model, and they always register exactly alike.

Soon after the first publication concerning the Stephenson-Wolinski tonometer I imported one, and gave it a fair trial, comparing the reading in each case with that of the Schiötz instrument. I soon convinced myself that it was absolutely unreliable, and all of my assistants soon reached the same conclusion. There would sometimes be a difference of 40 or 50 mm. in the reading of different observers, and in fact the same observer would make the tension one time 30 and the next time 90! It is not nearly delicate enough. In other words, the difference registered when the 0 in the aperture was a shade short of the line, and when it was a shade beyond the line might be 20 or 30; a difference two observers might easily make. Consequently, after a couple of weeks' trial, we discontinued using it in the clinic; whereas after a two weeks' trial of the Schiötz tonometer, all of us realized what an invaluable aid to the accurate study of intra-ocular tension Prof. Schiötz had given to his colleagues the world over.

As the Stephenson-Wolinski tonometer is still advertised in THE OPHTHALMOSCOPE, it seems only just that prospective purchasers should be informed that it is not a reliable instrument.*

NEW YORK CITY,
April 9th, 1913.

Respectfully,
WILLIAM B. MARPLE.

*The fact that the results yielded by the Stephenson-Wolinski tonometer have been found to be discrepant led Messrs. John Weiss and Son, Limited, to discontinue the advertisement of the instrument several months ago.—EDITOR.

NOTES AND ECHOES.

Deaths.

WITH regret, we have to announce the death of Mr. Charles George Lee. Mr. Lee held the post of surgeon to the Liverpool Eye and Ear Infirmary, and was a member of the Ophthalmological Society of the United Kingdom. He was an ex vice-president of the Liverpool Medical Institution.

Mr. Matthew A. Adams, consulting surgeon to the Kent County Ophthalmic Hospital, at Maidstone, the inventor of the "Horamagraph," an instrument for investigating the field of vision, has died at the age of 77 years.

Dr. Boleslaw Gepner, who studied with von Graefe (1865-1867), has died at Warsaw in his 78th year. He translated Donders' great work into Polish.

Dr. T. E. Moret, extraordinary professor of ophthalmology in Buenos Aires, is dead.

Dr. C. H. A. Westhoff, medical director of the Royal Wilhemina Institution, Bandoeng, Java, whose work on behalf of the Blind in the Dutch East Indies has been productive of much good, is dead, in his 65th year. His death took place while returning from Sydney to Java.

The following deaths are announced from America :—

Dr. James L. Thompson, of Indianapolis, at the age of 80 years.

Dr. B. F. Graham, of Minneapolis, aged 73 years.

Dr. L. B. Janquet, of New Orleans, aged 62 years.

Dr. S. Cuthbertson, of Vevay, Indiana, aged 60 years,

* * * *

The Late
Sir Henry Swanzy.

AT a meeting of the members of the Council of the Royal Victoria Eye and Ear Hospital, Dublin, on April 15th, the following resolution was adopted :—“ The President and Council of the Royal Victoria Eye and Ear Hospital desire to place on record their deep sense of the irreparable loss which has been sustained by them personally and by the hospital in the decease of their honorary secretary, the late Sir Henry Rosborough Swanzy. The hospital owes its origin almost entirely to his initiative and public spirit, and the present existing excellence of its structure and organization is largely to be ascribed to the unremitting personal attention which he devoted to every detail. It was through his loyal and single-hearted effort that the many difficulties surrounding the effectual amalgamation of the two older hospitals—St. Mark’s Ophthalmic Hospital and the National Eye and Ear Infirmary—were surmounted through the machinery of the Act of Parliament obtained in 1895. Since that date he never spared himself in seeking to arouse in others his own enthusiasm on its behalf, and in promoting its development and improvement in everything that modern science could suggest. This hospital was the great aim of his life, and it stands to-day as a lasting and worthy monument to his memory. The President and Council desire to convey to his family their heartfelt and sincerest sympathy with them in the sorrow of their great bereavement.

Sir Henry Swanzy, by the way, left personal estate in the United Kingdom valued a £12,487.

* * * *

The late
Dr. Cecil Shaw.

THE following resolution was adopted at the meeting of the Senate of Queen’s University, Belfast, on April 16th, on the motion of Dr. J. Walton Browne, seconded by Sir Peter Connell :—

“ That the Senate have heard with very great regret the announcement of the death on April 10th of Dr. Cecil Shaw, lecturer in the university on ophthalmology and otology. They desire to place on record their sense of the eminent services which Dr. Shaw rendered to the advancement of the special branches of medical science to which he devoted himself, and to their teaching both here and in the hospitals in which the students of our medical school receive their clinical training. They request the Vice-Chancellor to convey this resolution to Dr. Shaw’s widow, with the assurance of the Senate’s sincere and deep sympathy with her in her bereavement.”

At the meeting of the Ulster Medical Society, under the chairmanship of its president, Dr. Richard Whytock Leslie, on April 17th, the following

resolution was placed on the minutes on the motion of Professor J. A. Lindsay, seconded by Professor Symington :—

“The fellows and members of the Ulster Medical Society desire to put on record their sorrow at the death of Dr. Cecil Shaw and their sense of the serious loss which the society and the medical profession have thereby sustained, and they desire to convey their sincere condolence to Mrs. Shaw and other relatives.”

* * * *

Appointments. Mr. A. H. PAYAN DAWNAY, a valued correspondent of THE OPHTHALMOSCOPE, has been appointed full surgeon to the Western Ophthalmic Hospital, Marylebone Road, London, W.

Mr. Frank A. Juler has been appointed assistant surgeon, and Mr. S. H. Browning bacteriologist, to the Central London Ophthalmic Hospital.

Mr. R. A. Greeves has been appointed curator and librarian to the Royal London Ophthalmic Hospital.

Mr. Sydney Stephenson has been appointed ophthalmic surgeon to the King Edward Memorial Hospital, Ealing, W.

Mr. R. B. D. Hird has been appointed a medical referee under the Workmen's Compensation Act, 1906, for County Court Circuits Nos. 21, 22, and 36, with a view to his being employed in all ophthalmic cases arising in those Circuits.

Dr. H. M. Traquair has been appointed assistant ophthalmic surgeon to the Edinburgh Royal Infirmary.

Mr. H. W. Boreham has been appointed clinical tutor to the senior ophthalmic department of the Edinburgh Royal Infirmary, and also assistant ophthalmic surgeon to the Eye, Ear, and Throat Infirmary, Edinburgh.

Dr. T. Harrison Butler, editorial secretary of THE OPHTHALMOSCOPE, has been appointed ophthalmic surgeon to the Royal Midland Counties Home for Incurables, Leamington Spa.

Mr. Arthur Fells has been appointed surgeon to the Bristol Eye Dispensary.

Mr. Henry G. W. Dawson has been appointed assistant ophthalmic surgeon to the Chesterfield and North Derbyshire Hospital.

Mr. E. C. Temple Smith has been appointed ophthalmic surgeon to St. Vincent's Hospital, Sydney, N.S.W.

Dr. M. Wirths has been recognised as *privat-dozent* of ophthalmology at Rostock; Dr. Megardi at Padua; Dr. R. Pardo at Genoa; Dr. F. Grignolo at Turin; and Dr. Colucci at Rome.

Dr. Hans Köllner, assistant in the Berlin University Klinik, has been appointed *Oberarzt* in the Würzburg Augenlinik.

Dr. K. Wessely, extraordinary professor of ophthalmology, has been promoted to the chair of ophthalmology at Würzburg, in succession to Dr. von Hess.

Dr. Georg Levinsohn, *privat-dozent*, has been appointed professor in Berlin.

Dr. A. Bietti, extraordinary professor of ophthalmology, has been appointed professor of ophthalmology in Siena.

Professor Pes, of Cagliari, Sardinia, has received a call to Modena.

* * * *

Distinctions. PROFESSOR WOLFGANG STOCK, director of the University Eye Klinik in Jena, has had the order of the Swedish North Star bestowed upon him by H.M. the King of Sweden.

The title of *Geheimmedizinalrat* has been bestowed upon Dr. Peters, of Rostock.

Dr. Rigobert Possek, *privat-dozent*, has been granted the title of extraordinary professor of ophthalmology in Gratz.

Mr. J. B. Story, senior surgeon to the Royal Victoria Eye and Ear Hospital, Dublin, has been elected to the vacant seat on the Council of the Royal College of Surgeons in Ireland.

* * * *

Presentation to Dr. George Mackay. ON the occasion of his retirement from the post of ophthalmic surgeon to the Royal Infirmary, Edinburgh, Dr. George Mackay was entertained to a complimentary dinner by his old house-surgeons and a group of intimate medical friends and colleagues. Lieutenant-Colonel Sir Joseph Fayrer, Bart., superintendent of the Royal Infirmary, presided at the dinner.

In the course of the evening Dr. Mackay was presented with a silver rose-bowl bearing the following inscription :—" Presented to George Mackay, Esq., M.D., F.R.C.S.E., by his old house-surgeons as a mark of their esteem and of their admiration of his brilliant work as ophthalmic surgeon to the Royal Infirmary."

In making the presentation on behalf of the old house-surgeons, Dr. J. V. Paterson said that neither in this country nor on the Continent had he met a more brilliant operator or sounder clinician than their old chief.

* * * *

The Notification of Ophthalmia Neonatorum. FROM a report made by the medical officer of the Local Government Board on the Incidence of Notifiable Infectious Diseases in England and Wales (new series No. 78) we learn that ophthalmia neonatorum was compulsorily notifiable at the commencement of the year in 119 districts, and became notifiable in eight additional districts during 1912. The cases reported to the Board from those areas numbered 2,186. In London, 697 cases were notified; in Manchester, 527; in Stoke-on-Trent, 237; and in Birmingham, 222.

* * * *

International Congress of Medicine. THE presidency of the section of ophthalmology in the XVIIth International Congress of Medicine, rendered vacant by the lamented death of Sir Henry Swanzy, has been accepted by Sir Anderson Crichton, Bart.

* * * *

A Prize for Ophthalmology. THANKS to the liberality of a generous donor, who desires to remain anonymous, a prize of 5,000 francs will be awarded in 1914 for the best work dealing with the ætiology, the prophylaxis, and the treatment of those forms of iritis, irido-cyclitis, or cyclitis arising from causes other than

syphilis. Prize essays must have been presented to one of the ophthalmological societies, in France or elsewhere. The jury will be composed of three members chosen from among the chief Parisian ophthalmological institutions. The essays may be written in French, German, or English. They must be received, at the latest on August 15th, 1914, at the *Bureau des Annales d'Oculistique*, 26, Boulevard Raspail, Paris.

* * * *

**The Belgian
Ophthalmological
Society.**

ON the occasion of the Universal Exhibition, held at Gand from April to October, 1913, the Belgian Ophthalmological Society has convened a special meeting for August 2nd and 3rd next, to which foreign colleagues are cordially invited. Communications to Professor van Duyse, 65, Rue Basse des Champs, Gand, Belgium.

* * * *

**The International
Trachoma Prize.**

THE Hungarian Minister of the Interior has nominated the following as the jury to award the prize of 1,000 crowns for the best work dealing with the ætiology of trachoma:—Professor Kolle, of Bern, Professor Nuttall, of Cambridge, and Professor E. v. Grósz, of Budapest. The award will be announced at the XVIIth International Congress of Medicine.

* * * *

**Ophthalmia Neonat-
orum in Hungary.**

A DECREE of the Royal Hungarian Minister of the Interior was promulgated in March last dealing with the obligatory adoption of measures of prevention against ophthalmia neonatorum. The material points of the decree embody the following points.—Every certified midwife shall carry in her bag a bottle of 1 per cent. silver acetate and a “dropper.” As soon as a baby is born, the midwife shall cleanse the eyelids with water and gauze and wool, and then instil one drop of the silver acetate into each eye. The midwife shall not dispense with this obligation unless with the assent of the medical man assisting at the labour, if such should be the case. And such exemption must be entered by the doctor himself in the book kept by the midwife. Any neglect to follow the measures described above will be punished by a fine of 200 crowns, and in case of a second offence, by imprisonment for a term not exceeding fifteen days. By another official decree, published at the same time as the foregoing, every pharmacy must stock silver acetate. The forthcoming supplement of the Hungarian Pharmacopœia, Edition III, will include the remedy among the officinal preparations.

* * * *

**Minto Ophthalmic
Hospital, Bangalore.**

CONSIDERABLE progress is being made in the founding of hospitals in India. The Maharajah of Mysore takes very great interest in the development of these institutions, and in June, 1897, the Maharani-Regent, the mother of the present ruler, laid the foundation stone of the Victoria Hospital, and in December, 1910, the Maharajah laid the foundation stone of the Minto Ophthalmic Hospital. Much of the credit of this is due to the senior surgeon, Colonel Smyth, who used his influence to get a special hospital for treatment of diseases of the eye. Colonel Smyth had studied recent improvements in hospital arrangements in England, and reproduced many of these in the

designs of the new hospital. On January 31st, 1913, the new building, which was called the Minto Ophthalmic Hospital, was opened by His Highness the Maharajah of Mysore, G.C.S.I. It is a handsome building, which affords in-patient accommodation for thirty-four males, thirty-four females, and twelve children. There are two operating theatres, and the building covers 20,190 square feet. To the regret of all, Colonel Smyth had left by this time, and Dr. Iyenjar is the superintendent.* The Maharajah, after expressing his gratification that such an institution should have been built and the pleasure with which he declared it open, said that a third hospital was about to be constructed, and suggested that after that the turn of the Maternity Hospital might come. He impressed upon his hearers the medical needs of the outlying districts, especially in Malnad, where the steady decrease in the population was a matter of great concern to his Government. He expressed his confidence in the officers of his own medical service, many of whom possessed English and other European qualifications. He hoped the number of private medical practitioners in his State would quickly increase, as he was anxious that his people, both in matters sanitary and medical, should rely more and more on themselves. He trusted that those responsible for the management of the hospital would strive to make it a worthy memorial of Lord Minto's friendship to the State and of his eminent services to the people of India.—*British Medical Journal*, March 22nd, 1913.

* * * *

The late Professor J. v. Michel. THE friends and admirers of Julius v. Michel have decided to place a bronze bust of the late professor in the *Königlichen Universitäts-Augenklinik*, Berlin, alongside those of his predecessors in office, A. von Graefe and Schweigger. Subscriptions may be sent to Professor Hethey, Berlin-Wilmersdorf, Kaiserallee 23.

* * * *

The National Physical Laboratory. THE Annual Meeting of the General Board of the National Physical Laboratory was held recently at the rooms of the Royal Society, when the report and accounts for the year 1912, and the statement of work for 1913 were presented and approved for transmission to the President and Council of the Royal Society.

In former years this meeting has usually been held at Teddington during the month of March, and has been combined with an inspection of the laboratory by the members of the Board. In consequence of the change in the financial year, the annual inspection will in future be held at a later date. This year it is to take place on Thursday, June 26th, when the Right Hon. A. J. Balfour will open the new buildings recently erected.

These buildings complete a scheme, initiated in 1909, to provide laboratories for metallurgy and optics, with administrative offices, at an estimated cost of £30,000, exclusive of equipment; of this sum the Treasury undertook to provide £15,000, provided the remainder were forthcoming from other sources.

In 1910 the late Sir Julius Wernher generously provided £10,000 for the erection of the metallurgy laboratory, and on learning lately that the actual cost had exceeded the sum available by £936, Lady Wernher kindly defrayed the deficit.

To secure the further sum necessary for the completion of the scheme, and

* This statement must not be taken literally—EDITOR.

to obtain funds for the equipment of the buildings, an "Additional Funds Committee," of which the late Sir William White was chairman, was appointed during 1912. In their report this committee state that the Royal Commissioners for the Exhibition of 1851 had given a donation of £5,000 to the building fund, thus completing, with the gift of Sir Julius Wernher, the £15,000 required to meet the Treasury grant.

Generous help towards equipment has been received from many sources, including a number of the City Companies. The committee, however, point out that considerable sums are still necessary adequately to provide the equipment which is essential for the proper development of the work.

The block of buildings for optics and administration is now nearly complete, and it is to open these that Mr. Balfour has promised to be present on June 26th.

The report of the laboratory for the year 1912 contains, as usual, matter of technical interest.

* * * *

Concerning a Diploma
in Ophthalmology.

AT a meeting of the Convocation of the University of Manchester, held on May 23rd last, a resolution was moved by Dr. K. A. Goodfellow, and carried by 16 votes to 2—"That the institution of a diploma in ophthalmology is not to be desired."

Dr. Goodfellow said that the proposal for the institution of such a diploma was unnecessary. There were several branches of medicine which would have as good a claim to special diplomas.

THE OPHTHALMOSCOPE DIARY.

Midland Ophthalmological Society.	June 3rd	Shrewsbury Eye Hospital.
	4.15 p.m.	
Section of Ophthalmology, <i>Royal Society of Medicine.</i>	June 4th	1, Wimpole Street, London.
	8.30 p.m.	
Section of Ophthalmology, <i>American Medical Association.</i>	June 17th	Minneapolis, Minn., U.S.A.
Oxford Ophthalmological Congress.	July 17th	Keble College, Oxford.
	and 18th	
Section of Ophthalmology, <i>British Medical Association.</i>	July 23rd	Brighton.
	to 25th	
Belgian Society of Ophthalmology	Aug. 2nd	Ghent
	and 3rd	
Section of Ophthalmology, <i>XVII. Int. Congress of Medicine.</i>	Aug. 7th	London.
	to 12th	
American Academy of Ophthalmology and Oto-Laryngology.	Nov. 27th	Chattanooga, Tenn., U.S.A.

ENDING SECT. OCT 28 1964

RE The Ophthalmoscope
1
078
v.11
no.1-6

Biological
& Medical
Serials

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY
